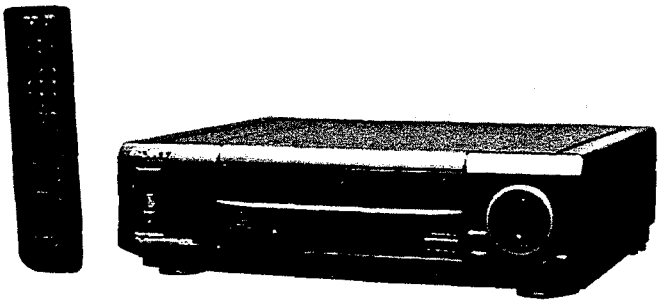
SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/ X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA

RMT-V181B/V181C/V181D/V181E/V181F/V181G

SERVICE MANUAL



VHS

- **Refer to the SERVICE MANUAL of VHS MECHANICAL ADJUSTMENTS IV for MECHANICAL ADJUSTMENTS. (9-973-623-11)** V03056 #201-1k2

ME Model
SLV-X315ME/X425ME/X515ME

PS Model
SLV-X315PS/X425PS/X515PS

SG Model
SLV-X315SG/X515SG

Australian Model
SLV-X325AS/X525AS

New Zealand Model
SLV-X325NZ/X525NZ

South African Model
SLV-X325SA/X525SA

African Model
SLV-X335AF

H MECHANISM

SPECIFICATIONS

System

Channel coverage
See next page.
RF output signal
UHF channels 30 to 39
Aerial out
75-ohm asymmetrical aerial socket

Inputs and outputs

LINE IN
VIDEO IN, phono jack (1)
Input signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
AUDIO IN, phono jack (1)
Input level: 327 mVrms
Input impedance: more than 47 kilohms
LINE OUT
VIDEO OUT, phono jack (1)
Output signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
AUDIO OUT, phono jack (1)
Standard output: 327 mVrms
Load impedance: 47 kilohms
Output impedance: less than 10 kilohms

General

Power requirements
220 – 240 V AC, 50 Hz
Power consumption
19 W (max.)
Operating temperature
5°C to 40°C (41°F to 104°F)
Storage temperature
–20°C to 60°C (–4°F to 140°F)
Dimensions
Approx. 355 × 102 × 278 mm (w/h/d)
(Approx. 14 × 4 1/8 × 11 inches) including projecting parts and controls
Mass
Approx. 4.0 kg (8 lb 13 oz)

Supplied accessories

Remote commander (1)
R6 (size AA) batteries (2)
Aerial cable (1)
Mains lead (1)

Design and specifications are subject to change without notice.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

MICROFILM

VIDEO CASSETTE RECORDER

SONY®

• **DIFFERENT SPECIFICATIONS LIST**

MODEL	SLV-X315			SLV-X325			SLV-X335
SPECIFICATIONS	ME	PS	SG	AS	NZ	SA	AF
VIDEO HEADS	2 HEADS			2 HEADS			2 HEADS
VIDEO SYSTEM							
NTSC 3.58 (REC/PB)	× / ×			× / ×			× / ×
NTSC 4.43 (REC/PB)	× / ○			× / ○		× / ×	× / ×
NTSC ON PAL TV	○			×			×
PAL (REC/PB)	○ / ○			○ / ○			○ / ○
SECAM (REC/PB)	× / ×			× / ×			× / ○
MESECAM (REC/PB)	○ / ○			× / ×			○ / ○
RECORD MODE NTSC	×			×			×
RECORD MODE PAL	SP			SP			SP
PLAY MODE NTSC	SP			SP		×	×
PLAY MODE PAL	SP			SP			SP
BROADCASTING SYSTEM	BG/DK			BG		I	BG/DK
FREQUENCY COVERAGE VHF	E2 TO E12			AS0 TO AS12	NZ1 TO NZ11	SA4 TO SA13	E2 TO E12
UHF	E21 TO E69			AS28 TO AS69		E21 TO E69	E21 TO E69
CATV	S01 TO S05, S1 TO S41			S01 TO S05, S1 TO S41			S01 TO S05, S1 TO S41
RF MOD SYSTEM	G/K			G		I	G/K
G-CODE SYSTEM	×			○			×
POWER REQUIREMENTS	110-240V AC 50/60Hz			220-240V AC 50Hz		110-240V AC 50/60Hz	110-240V AC 50/60Hz
POWER CONSUMPTION	19W			19W			19W
REMOTE COMMANDER	RMT-V181E			RMT-V181G		RMT-V181F	RMT-V181E

MODEL	SLV-X425		SLV-X515			SLV-X525		
SPECIFICATIONS	ME	PS	ME	PS	SG	AS	NZ	SA
VIDEO HEADS	2 HEADS		4 HEADS			4 HEADS		
VIDEO SYSTEM								
NTSC 3.58 (REC/PB)	○ / ○		× / ×			× / ×		
NTSC 4.43 (REC/PB)	○ / ○		× / ○			× / ○		× / ×
NTSC ON PAL TV	○		○			○		×
PAL (REC/PB)	○ / ○		○ / ○			○ / ○		
SECAM (REC/PB)	× / ×		× / ×			× / ×		
MESECAM (REC/PB)	○ / ○		○ / ○			○ / ○		
RECORD MODE NTSC	SP		×			×		
RECORD MODE PAL	SP		SP/LP			SP/LP		
PLAY MODE NTSC	SP		SP/LP/EP			SP/LP/EP		
PLAY MODE PAL	SP		SP/LP			SP/LP		
BROADCASTING SYSTEM	BG/DK		BG/DK			BG		I
FREQUENCY COVERAGE VHF	E2 TO E12		E2 TO E12			AS0 TO AS12	NZ1 TO NZ11	SA4 TO SA13
UHF	E21 TO E69		E21 TO E69			AS28 TO AS69	E21 TO E69	
CATV	S01 TO S05, S1 TO S41		S01 TO S05, S1 TO S41			S01 TO S05, S1 TO S41		
RF MOD SYSTEM	G/K		G/K			G		I
G-CODE SYSTEM	×		×			○		
POWER REQUIREMENTS	110-240V AC 50/60Hz		110-240V AC 50/60Hz			220-240V AC 50Hz		110-240V ACBG 50/60Hz
POWER CONSUMPTION	19W		19W			19W		
REMOTE COMMANDER	RMT-V181E		RMT-V181B			RMT-V181C		RMT-V181D

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer.

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
4. Look for parts which, through functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replace-ment.
5. Check the B+ voltage to see it is at the values specified.
6. Flexible Circuit Board Repairing
   - Keep the temperature of the soldering iron around 270°C during repairing.
   - Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
   - Be careful not to apply force on the conductor when soldering or unsoldering.

2097

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SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/ X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA

SERVICE NOTE

1. HOW TO RETURN THE PINCH ROLLER, GUIDE ROLLER AND ELEVATOR CAM TO STOP MODE

1) Remove the VHS MD assembly from the machine. (Refer to section 2-4. Removal.)
2) Rotate the worm gear-1 of the cam motor beneath the MD assembly in the direction arrow Ⓐ using a screw driver tip.

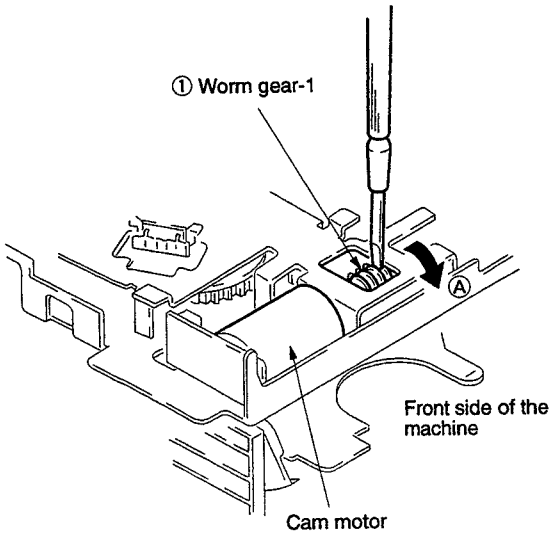


Fig. 1

2. HOW TO RETURN A TAPE INTO CASSETTE HALF

A tape can be rewound into a cassette half by rotating the flywheel-1 of the capstan motor in the direction of Ⓐ with hand.

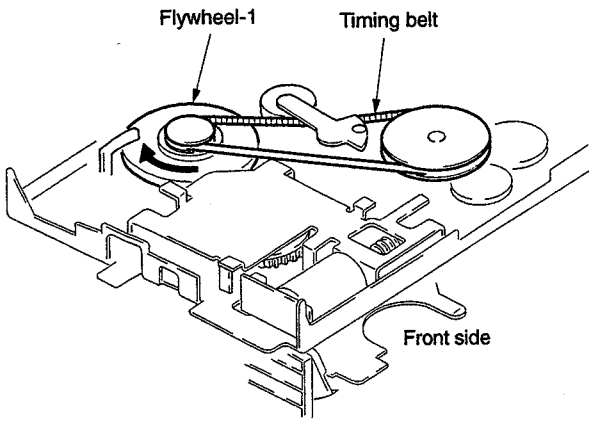


Fig. 2

3. HOW TO REMOVE A CASSETTE FROM A MACHINE IF A CASSETTE IS LEFT IN A MACHINE IN TROUBLE

Execute the section 2, and keep rotating the flywheel-1.

When executing section 1 to 3, take care that a tape slack should not be caught by a mechanism or a tape should not be damaged.

4. HOW TO REMOVE DRUM ASSEMBLY

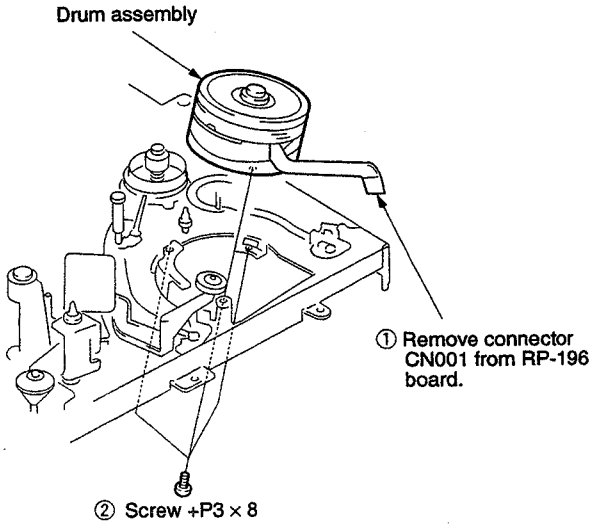


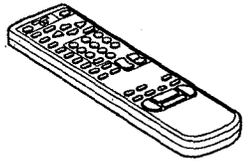
Fig. 3

Step 1

Unpacking

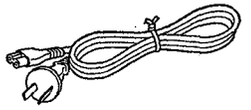
Check that you have received the following items with the VCR:

- Remote commander

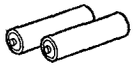


- Aerial cable

- Mains lead



- R6 (size AA) batteries



Checking your model name

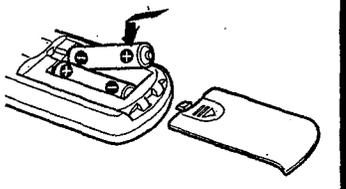
The instructions in this manual are for the 2 models : SLV-X525AS and X525NZ. Check your model number by looking at the rear panel of your VCR. The X525AS is the model used for illustration purposes. Any difference in operation is clearly indicated in the text, for example, "SLV-X525AS only."

Step 2

Setting up the remote commander

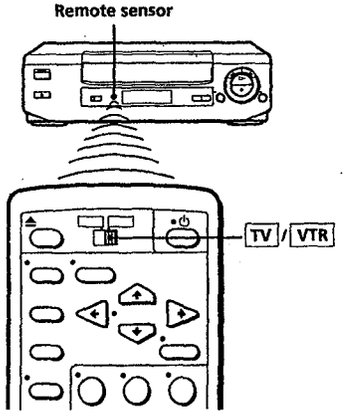
Inserting the batteries

Insert two R6 (size AA) batteries by matching the + and – on the batteries to the diagram inside the battery compartment.



Using the remote commander

You can use this remote commander to operate this VCR and a Sony TV. Buttons on the remote commander marked with a dot (•) can be used to operate your Sony TV.



To operate	Set TV/VTR to
the VCR	VTR and point at the remote sensor on the VCR
a Sony TV	TV and point at the remote sensor on the TV

Notes

- With normal use, the batteries should last about three to six months.
- If you do not use the remote commander for an extended period of time, remove the batteries to avoid possible damage from battery leakage.
- Do not use a new battery with an old one.
- Do not use different types of batteries.
- The TV/VIDEO button only works when the TV/VTR switch is set to TV.

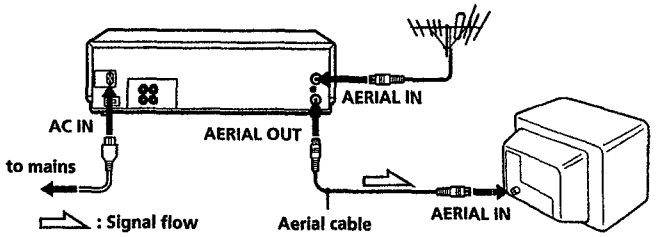
SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/
X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA

SECTION 1
GENERAL

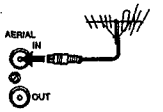
This section is extracted from the SLV-X525AS/NZ instruction manual.

Step 3

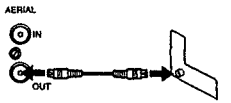
Connecting the VCR



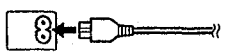
1 Disconnect the aerial input cable from your TV and connect it to AERIAL IN on the rear panel of the VCR.



2 Connect AERIAL OUT of the VCR and the aerial input of your TV using the supplied aerial cable.



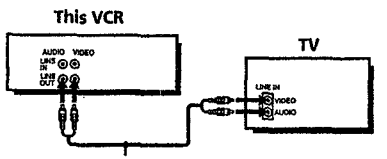
3 Connect AC IN of the VCR to the mains using the supplied mains lead.



Additional connection

To a TV that has phono type audio/ video input jacks

This additional connection improves picture and sound quality. Connect the TV as shown on the right using a commercially available connecting cable like the Sony VMC-710M/720M. If your TV has left and right audio input jacks, use a connecting cable like the Sony VMC-910MS.

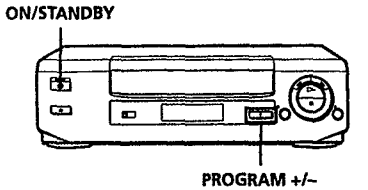


VMC-710M/720M audio/video cable (not supplied)

Step 4

Tuning the VCR to your TV

If you have connected your VCR to the TV using the audio/video cable, skip this step.



1 ON/STANDBY — Press ON/STANDBY to turn on the VCR.

2 – PROGRAM + — Press PROGRAM +/– until "L" appears in the display window.

3 Turn on your TV and select a programme position for video playback.

Choose a channel between UHF 30 and 39 on the TV, where there is no picture and no sound or only a steady rustling sound.

This channel will now be referred to as the video channel.

4 Tune the TV so that a clear blue screen appears on the TV screen.

Refer to your TV manual for tuning instructions.

You have now tuned your TV to the VCR. From now on, whenever you want to play a tape, set the TV to the video channel.

If the blue screen does not appear clearly, see "To obtain a clear blue screen" on page 8.

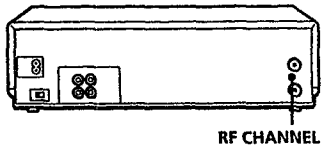
continued

To check to see if the TV tuning is correct

Set the TV to the video channel and press PROGRAM +/– on the VCR. If the TV screen changes to a different programme each time you press PROGRAM +/–, the TV tuning is correct.

To obtain a clear blue screen

If the blue screen does not appear clearly in step 4 above, turn the RF CHANNEL screw at the rear of the VCR with an RF screwdriver to a position where the TV clearly displays the blue screen.

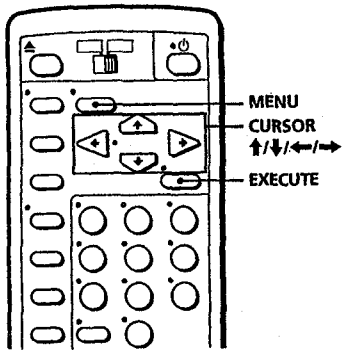


RF CHANNEL

1-3

Step 5

Setting the clock



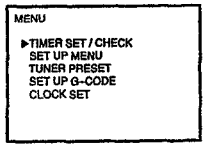
You must set the time and date on the VCR to be able to use the timer recording features properly. You can set the VCR clock using the on-screen display.

Before you start...

- Turn on the VCR and the TV.
- Set the TV to the video channel.

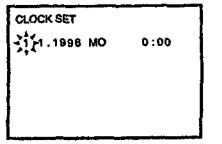
1 •MENU

Press MENU



2 •CURSOR •EXECUTE

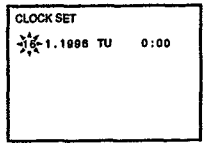
Press CURSOR ↑/↓ to move the cursor (▶) to CLOCK SET, then press EXECUTE.



3 •CURSOR

Press CURSOR ↑/↓ to set the day.

The day of the week is set automatically.

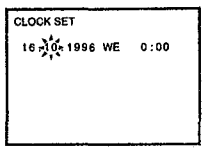


continued

Step 5 : Setting the clock (continued)

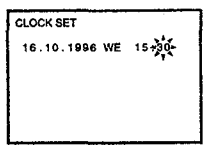
4 CURSOR

Press CURSOR ➡ to flash the month and set the month using CURSOR ⬆/⬇.



5 CURSOR

Set the year, hour and minutes in sequence, using CURSOR ➡ to flash the item to be set, and CURSOR ⬆/⬇ to select the digits.



6 EXECUTE

Press EXECUTE to start the clock.

Note

- The menu disappears automatically if you don't proceed for more than a few minutes.

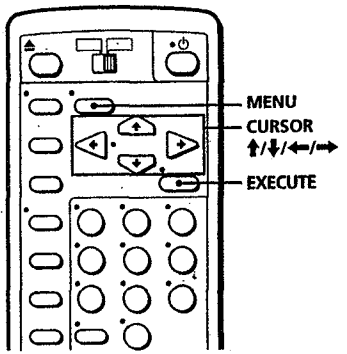
Tip

- To change the digits during setting, press CURSOR ⬅ to return to the item to be changed, and select the digits using CURSOR ⬆/⬇

1-4

Step 6

Tuning the VCR



This VCR is capable of receiving following channels.

(SLV-E525AS)	(SLV-E525NZ)
VHF AS0 to AS12	VHF NZ1 to NZ11
UHF AS28 to AS69	UHF E21 to E69
CATV S1 to S41	CATV S1 to S41
CATV S01 to S05	CATV S1 to S05

First, we recommend that you preset the receivable channels in your area using automatic presetting. Then, if some channels could not be preset automatically, you can preset them manually; if there are any unwanted channels among the preset ones, you can disable the channels.

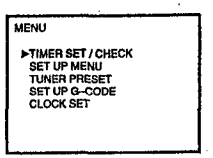
Before you start...

- Turn on the VCR and the TV.
- Set the TV to the video channel.

Presetting all receivable channels automatically

1 MENU

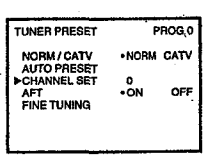
Press MENU.



2 CURSOR

EXECUTE

Press CURSOR ⬆/⬇ to move the cursor (▶) to TUNER PRESET, then press EXECUTE.



continued

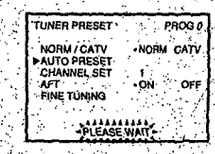
Step 6 : Tuning the VCR (continued)

3 Press CURSOR ↑/↓ to move the cursor (▶) to AUTO PRESET, then press EXECUTE.

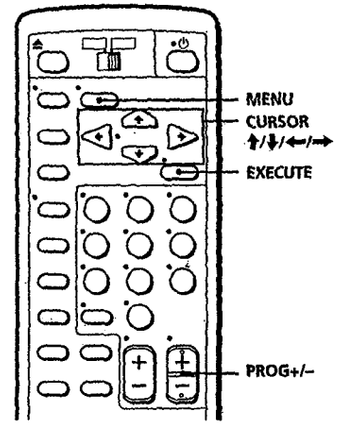
CURSOR

•EXECUTE

All receivable channels are preset in numerical sequence. When no more receivable channels can be found, presetting stops and the picture from the lowest numbered channel is displayed on the TV screen.

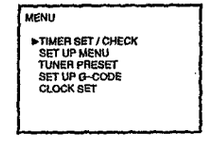


Presetting channels manually



1 •MENU

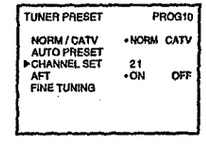
Press MENU.



2 •CURSOR

•EXECUTE

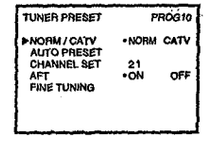
Press CURSOR ↑/↓ to move the cursor (▶) to TUNER PRESET, then press EXECUTE.



3 •CURSOR

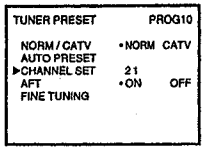
Press CURSOR ↑/↓/←/→ to move the cursor (▶) to NORM/CATV, then select NORM.

To preset CATV channels, select CATV.



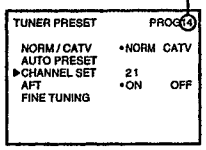
continued

4 Press CURSOR ↑/↓ to move the cursor (▶) to CHANNEL SET.



5 Press PROG +/– to select the programme position.

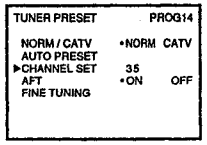
Selected programme position



6 Press CURSOR ➡ repeatedly until the channel you want is displayed.

Pressing CURSOR ⬅ goes back to the previous channels.

The channels are scanned in the following order.



(SLV-X525AS)

On-screen channel number	Corresponding TV channel
1	AS1
2	AS2
3	AS3
4	AS4
5	AS5
6	AS6
7	AS7
8	AS8
9	AS9
10	AS10
11	AS11
12	AS12
20	AS0
25	AS5A
26	AS9A
28-69	AS28-69
CATV 1-41	S1-S41
CATV 42-46	S01-S05

(SLV-X525NZ)

On-screen channel number	Corresponding TV channel
1	NZ1
3	NZ2
4	NZ3
5	NZ4
6	NZ5
7	NZ6
8	NZ7
9	NZ8
10	NZ9
11	NZ10
12	NZ11
21-69	E21-E69
CATV 1-41	S1-S41
CATV 42-46	S01-S05

If you know the number of the channel you want, press the programme number buttons. For example, for channel 5, first press "0" and then press "5."

7 To allocate another channel to another programme position, repeat steps 5 and 6.

8 Press EXECUTE.

Disabling unwanted programme positions

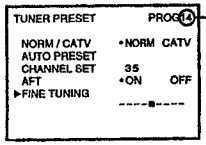
After tuning the TV channels, you can disable unused programme positions. The disabled positions will be skipped later when you press the PROG +/– buttons.

1. Press MENU, then select TUNER PRESET and press EXECUTE.
2. Select CHANNEL SET.
3. Press PROG +/– until the programme position you want to disable appears beside "PROG" on the TV screen.
4. Press programme number button "0" twice to display the number "0" beside CHANNEL SET.
5. Repeat steps 3 and 4 for other positions you want to disable.
6. Press EXECUTE.

If the picture is not clear

Normally, the Auto Fine Tuning (AFT) function automatically tunes in channels clearly. If, however, the picture is not clear, you may also use the manual tuning function.

1. Press PROG +/– to select the programme position for which you cannot obtain a clear picture.
2. Press MENU, then select TUNER PRESET and press EXECUTE.
3. Select FINE TUNING. The fine tuning meter appears.



Selected programme position

4. Press CURSOR ⬅/➡ to get a clearer picture, then press EXECUTE.

Note that the AFT (Auto Fine Tuning) setting switches to OFF.

Note

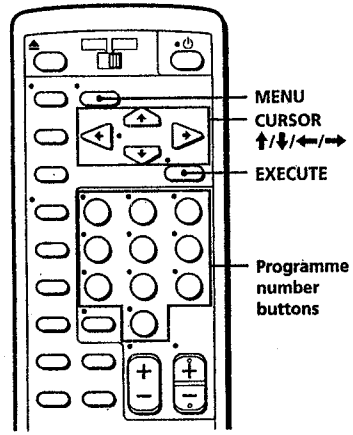
- The menu disappears automatically if you don't proceed for more than a few minutes.

Step 7

Setting up G-CODE

G-CODE is a feature in Sony VCRs that simplifies the task of programming the VCR to make timer recordings. Use the on-screen display to coordinate the programme position of each channel with the guide channel (the number that's assigned to each TV station in advance). To get the guide channel numbers, look in the programme guide for your area that features G-CODE numbers.

- If you want to record satellite broadcasts using G-CODE, see page 18.



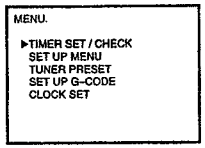
Before you start...

- Turn on the VCR and the TV.
- Set the TV to the video channel.

Setting the guide channels

1 •MENU

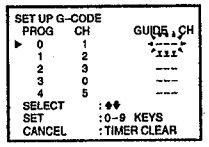
Press MENU.



2 •CURSOR •EXECUTE

Press CURSOR ↑/↓ to move the cursor (▶) to SET UP G-CODE, then press EXECUTE.

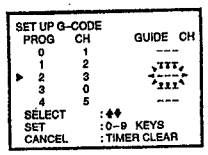
The preset channels are displayed on the screen and the GUIDE CH column flashes.



3 •CURSOR

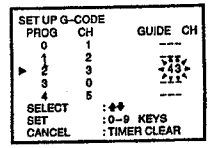
Press CURSOR ↑/↓ to move the cursor (▶) to the row on which you want to set the guide channel.

To display other pages for programme positions 5 to 49 (SLV-X525AS) or 6 to 50 (SLV-X525NZ), press CURSOR ↑/↓ repeatedly.



4 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⓪

Press the programme number buttons to enter the guide channel number assigned in the programme guide.



5

To set the guide channel of another station, repeat steps 3 and 4.

If you want to change the programme positions of the stations, follow the procedures in "Presetting channels manually" on page 13.

6 •EXECUTE

Press EXECUTE.

continued

Setting up G-CODE for satellite broadcasts

When your satellite tuner is connected via the AERIAL IN connector, first you have to set the programme position for each satellite channel using the TUNER PRESET menu. Then set the guide channel number for each satellite channel using the SET UP G-CODE menu.

If your satellite tuner is connected via the LINE IN jacks, you don't have to set programme positions nor guide channel numbers for satellite channels. Skip the following operations.

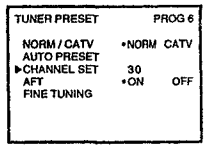
1 Turn on the satellite tuner.

2 Press MENU, then select TUNER PRESET and press EXECUTE.

3 Press PROG +/– to select a programme position you want to use for watching a satellite channel.

4 Select CHANNEL SET, then press CURSOR ➡ to tune the VCR to the satellite tuner.

The channel number displayed beside CHANNEL SET is used for receiving all satellite broadcasts from the satellite tuner.



5 Press PROG +/– to select another programme position for another satellite channel, and press the programme number buttons to enter the same channel number as the one displayed in step 4.

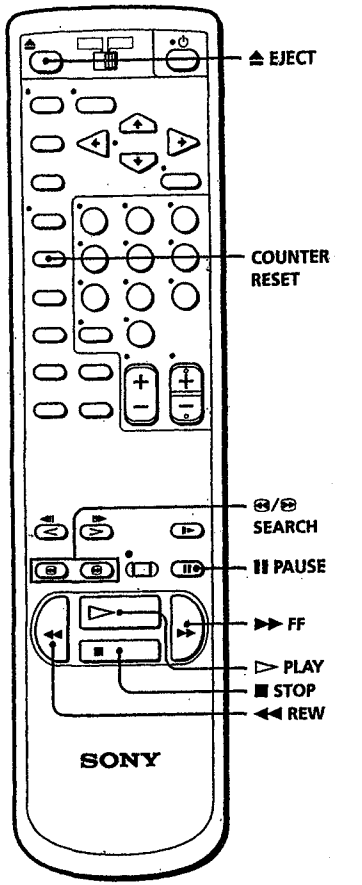
Repeat this step for all satellite channels.

6 Set the guide channel number for each programme position assigned to the satellite channel, following the procedures in "Setting the guide channels" on page 16.

Notes

- The menu disappears automatically if you don't proceed for more than a few minutes.
- If you use a satellite tuner connected via the LINE IN jacks, leave the GUIDE CH column blank (---).
- If you inadvertently entered a guide channel number, press TIMER CLEAR.
- The VCR does not allow entering the guide channel number, if the same number has been set.
- When you record a satellite broadcast using G-CODE, you need to select the desired channel on the satellite tuner manually.

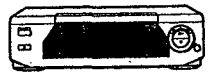
Playing a tape



1 Turn on your TV and set it to the video channel.

2 Insert a tape.

The VCR turns on and starts playing automatically if you insert a tape with its safety tab removed.



continued

Playing a tape (continued)

3 ▷ PLAY

Press ▷ PLAY.

When the tape reaches the end, it will rewind automatically.

Additional tasks

To	Press
Stop play	■ STOP
Pause play	❚❚ PAUSE
Resume play after pause	❚❚ PAUSE or ▷ PLAY
Search forward	▶▶ FF or ⦵ SEARCH during playback
Search backward	◀◀ REW or ⦵ SEARCH during playback
Fast-forward the tape	▶▶ FF during stop
Rewind the tape	◀◀ REW during stop
Eject the tape	⏏ EJECT

To set the colour system

If streaks appear during playback, set COLOR SYSTEM on the VCR to conform to the system that the tape was recorded in. (The normal setting is AUTO.)

If your tape was recorded in	Set COLOR SYSTEM to
PAL	PAL
NTSC	NTSC

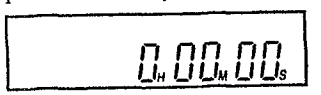
To play an NTSC-recorded tape

Set NTSC PB at the rear of the VCR according to the colour system of your TV.

If your TV is	Set NTSC PB to
PAL	ON PAL TV
NTSC 4.43	NTSC 4.43

To use the time counter

At the point on the tape that you want to find later, press COUNTER RESET. The counter in the display window resets to "0H00M00S." Search for the point afterwards by referring to the counter.

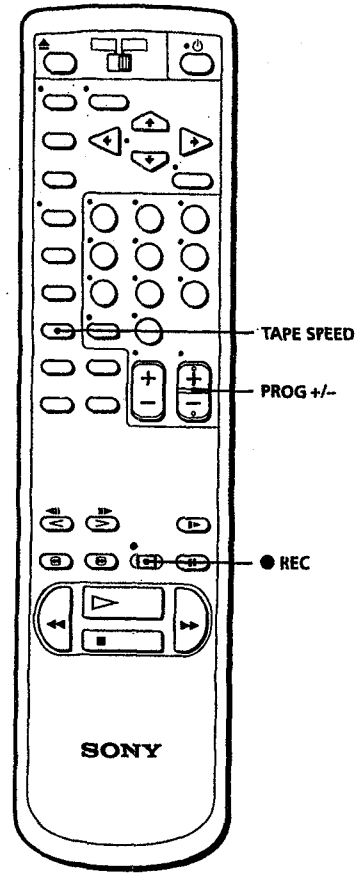


To display the counter on the TV screen, press DISPLAY.

Notes

- The counter resets to "0H00M00S" whenever a tape is reinserted.
- The counter stops counting when it comes to a portion with no recording.
- If a tape has portions recorded in both PAL and NTSC systems, the time counter reading will not be correct. This is due to the difference between the counting cycles of the two video systems.
- Depending on your TV, the following may occur while playing an NTSC-recorded tape:
  - the picture is black and white
  - the picture shakes
  - no picture appears on the TV screen
  - black streaks appear horizontally on the TV screen
  - the colour density increases or decreases.

Recording TV programmes



1 Turn on your TV and set it to the video channel.

2 Insert a tape with its safety tab in place.

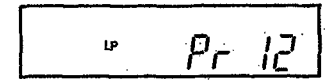
3 •PROG

Press PROG +/– to select the programme position you want to record.

4 TAPE SPEED

Press TAPE SPEED to select the tape speed, SP or LP.

LP (Long Play) provides recording time twice as long as SP, however, SP (Standard Play) produces better picture and audio quality.



5 ●REC

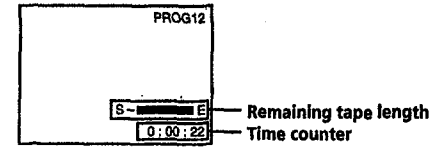
Press ● REC to start recording.

To stop recording

Press ■ STOP.

To check the remaining tape length

Press DISPLAY during playback or recording. The white bar indicates the approximate length of tape remaining.



To watch another TV programme while recording

1 If the TV is connected to the VCR using an audio/video cable, set the TV to TV input. If the TV is connected to the VCR using only the aerial cable, skip this step.

2 Select another programme position on the TV.

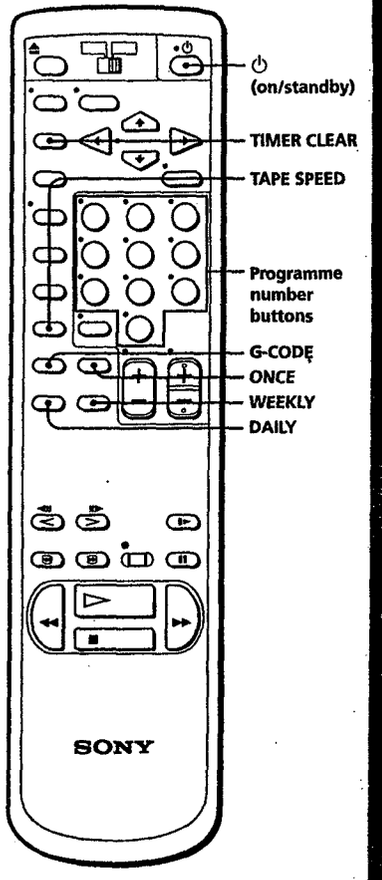
continued

Recording TV programmes using G-CODE

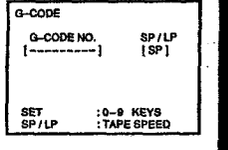
Just enter the programme's G-CODE number listed in the TV programme guide. The date, times and programme position of that programme are set automatically. You can preset up to eight programmes at a time.

Before you start...

- Check that the VCR clock is set to the correct time.
- Insert a tape with its safety tab in place. Make sure the tape is longer than the total recording time.
- Turn on your TV and set it to the video channel.



1 G-CODE Press G-CODE.

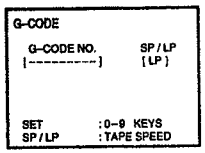


continued

Recording TV programmes using G-CODE (continued)

2 TAPE SPEED

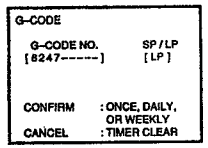
Press TAPE SPEED to select SP or LP.



3 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⓪

Press the programme number buttons to enter the programme's G-CODE number.

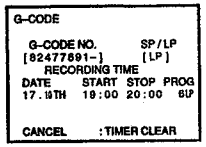
If you make a mistake, press TIMER CLEAR and re-enter the correct number.



4 ONCE or DAILY or WEEKLY

Press ONCE, DAILY or WEEKLY:

To record	Press
Only once	ONCE
Everyday Monday to Friday	DAILY
Once a week	WEEKLY



The date, start and stop times, programme position, and tape speed appear on the TV screen.

If the information is not correct, press TIMER CLEAR to cancel the setting.

5 To enter another setting, repeat steps 1 to 4.

6 ⏻

Press ⏻ to turn off the VCR.

The TIMER indicator appears in the display window and the VCR stands by for recording.

To stop recording

To stop the VCR while recording, press ■ STOP.

To record satellite broadcasts

If you connect the satellite tuner and the VCR, you can record satellite programmes.

1. Turn on the satellite tuner.
2. On the satellite tuner, select the satellite programme for which you wish to make a timer setting.
3. Repeat the steps described above.
4. Keep the satellite tuner turned on until the VCR finishes recording the satellite programme for which you have made a timer setting.

To use the VCR after setting the timer

To use the VCR before a timer recording begins, just press ⏻. The TIMER indicator turns off and the VCR switches on. Remember to press ⏻ to reset the VCR after using the VCR.

You can also do the following tasks while the VCR is recording:

- Reset the counter.
- Display tape information on the TV screen.
- Check the timer settings.
- Watch another TV programme.

Tip

- To cancel the procedure, press G-CODE before pressing ONCE, DAILY or WEEKLY.

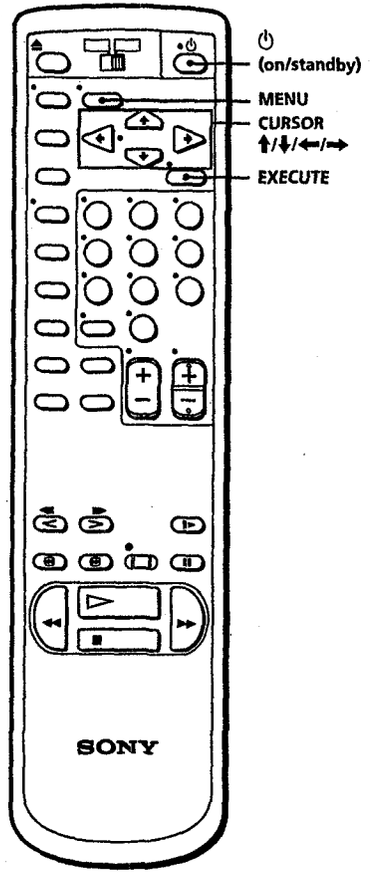
1-12

Setting the timer manually

If G-CODE is not available in your area, follow the instructions below to set the timer to record programmes.

Before you start...

- Check that the VCR clock is set to the correct time.
- Insert a tape with its safety tab in place. Make sure the tape is longer than the total recording time.
- Turn on your TV and set it to the video channel.



1 •MENU, •CURSOR, •EXECUTE

Press MENU and select TIMER SET/CHECK, then press EXECUTE.

TIMER SET/CHECK			16.10 WE
DATE	START	STOP	PROG
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --

2 •CURSOR

Set the date, start and stop times, programme position, and tape speed:

1 Press CURSOR ➡ to flash each item in turn.

2 Press CURSOR ↑/↓ to set each item.

To correct a setting, press CURSOR ← to return to that setting and reset.

TIMER SET/CHECK			16.10 WE
DATE	START	STOP	PROG
16.10 WE	--:--	--:--	-- SP
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --
--.--	--:--	--:--	-- --

To record the same programme every day or the same day every week, press CURSOR ↓ while the date is flashing. For details, see "Daily/weekly recording" below.

To record from a source connected to the LINE IN jacks, press INPUT SELECT to display "L" in the "PROG" position.

3 •CURSOR

Press CURSOR ➡ to confirm the setting.

The cursor (▶) appears at the top of the line. To enter another setting, move the cursor to the next line and repeat step 2.

4 •EXECUTE

Press EXECUTE.

5 •⏻

Press ⏻ to turn off the VCR.

The TIMER indicator appears in the display window and the VCR stands by for recording.

To record from other equipment, leave the connected equipment switched on.

To stop recording

To stop the VCR while recording, press ■ STOP.

Daily/weekly recording

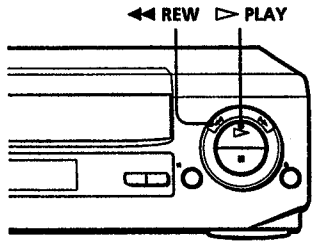
In step 2 above, press CURSOR ↓ to select the recording pattern. Each time you press CURSOR ↓, the indication changes as shown below.

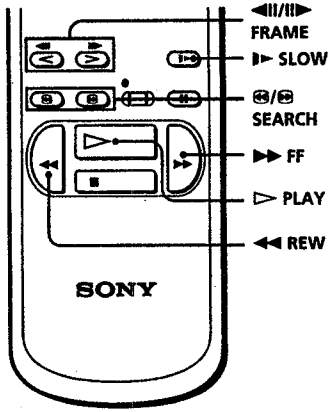
the current date → SU-SA → MO-SA → MO-FR → EVERY SA .....
→ EVERY MO → EVERY SU → 1 month later →(cycles backward)
→ the current date

Tips

- To set the programme position, you can also use the PROG +/– or programme number buttons.
- To set the tape speed, you can also use TAPE SPEED.

Playing/searching at various speeds





Playback options	Operation
Fast-forward/rewind	During stop, press ▶▶ FF or ◀◀ REW.
View the picture during fast-forward or rewind	During fast-forward, hold ▶▶ FF down. During rewind, hold ◀◀ REW down.
Play at high speed	During playback or pause, press ⏩ SEARCH or ⏪ SEARCH. To change direction, press II▶ FRAME or ◀II FRAME.
Play in slow motion	During playback or pause, press I▶ SLOW. To change direction, press II▶ FRAME or ◀II FRAME.
Play frame by frame	During pause, press II▶ FRAME or ◀II FRAME. Hold the button down to play one frame each second.
Play in reverse	During playback, press ◀II FRAME.
Rewind and start play	During stop, hold ◀◀ REW down on the VCR and press ▷ PLAY on the VCR.

To resume normal playback

Press ▷ PLAY.

Tip

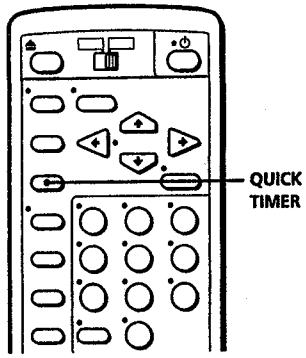
- Adjust the picture using TRACKING ▼/▲ (STILL ADJUST) if:
  - Streaks appear while playing in slow motion.
  - The picture shakes while pausing.

Notes

- The sound is muted during these operations.
- In the LP mode, noise may appear or there may be no colour.
- The picture may have white noise:
  - when playing at high speed in reverse
  - when playing in reverse slow motion
  - when playing in reverse.

Recording TV programmes using the quick timer

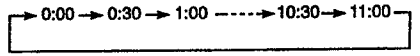
After starting recording in the normal way, you can have the VCR stop recording automatically after a specified duration.



1 While recording, press QUICK TIMER once.

2 Press QUICK TIMER repeatedly to set the duration.

Each press advances the time in increments of 30 minutes.



The duration decreases minute by minute to 0:00, then the VCR stops recording and turns off automatically.

To extend the duration

Press QUICK TIMER repeatedly to set to the new duration.

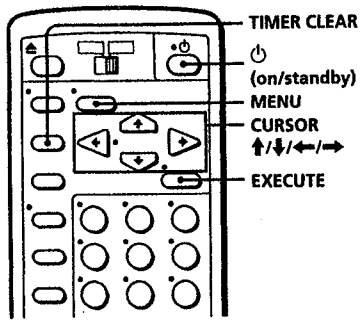
To stop recording

To stop the VCR while recording, press ■ STOP.

Tip

- You can also set the quick timer and start recording during the stop mode.

Checking/ changing/ cancelling timer settings



Before you start...

- Turn on your TV and set it to the video channel.

1 Press ⏻ to turn on the VCR.

2 Press MENU and select TIMER SET/CHECK:

- If you want to change a setting, go on to the next step.
- If you do not need to change the settings, press EXECUTE, then turn off the VCR to return to recording standby.

TIMER SET / CHECK			16.10 WE
DATE	START	STOP	PROG
▶17.10TH	19:00	20:00	6 SP
25.10FR	8:30	10:30	50 LP
MO-SA	21:00	22:00	35 LP
EVERY SU	9:45	12:30	L SP
--.--	--:--	--:--	-- -
--.--	--:--	--:--	-- -
--.--	--:--	--:--	-- -
--.--	--:--	--:--	-- -

3 Press CURSOR ↑/↓ to select the setting you want to change or cancel:

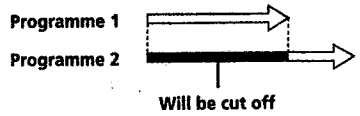
- To change the setting, press CURSOR ←/→ to flash the item you want to change, and press CURSOR ↑/↓ to reset it. Then, press CURSOR → repeatedly until the cursor (▶) appears at the top of the line.
- To cancel the setting, press TIMER CLEAR.

4 Press EXECUTE.

If any settings remain, turn off the VCR to return to recording standby.

When the timer settings overlap

The programme that starts first has priority and the second programme starts recording only after the first programme has finished. If the programmes start at the same time, the programme listed first in the menu has priority.



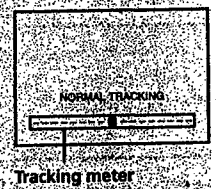
1-15

Adjusting the picture

Adjusting the tracking

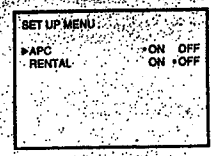
Although the VCR automatically adjusts the tracking when playing a tape (the AUTO TRACKING indicator flashes in the display window, then lights steadily), distortion may occur if the tape was recorded in poor condition. If so manually adjust the tracking.

Press TRACKING ▼/▲ (STILL ADJUST) on the VCR to display the tracking meter. The distortion should disappear as you press one of the two buttons. To resume automatic tracking adjustment, eject the tape and reinsert it.



About Adaptive Picture Control (APC)

Adaptive Picture Control (APC) automatically improves recording and playback quality by adjusting the VCR to the condition of the video heads and tape. To maintain better picture quality, we recommend that you set APC to ON in the SET UP MENU (with the APC indicator in the display window lit).



APC playback

The APC function automatically works on all types of tapes, including rental tapes and tapes that were not recorded with APC.

APC recording

Whenever you insert a tape and first start recording, the VCR adjusts to the tape using the APC function (the APC indicator flashes rapidly). This adjustment is retained until the tape is ejected.

To deactivate the APC

Press MENU and select SET UP MENU, then set APC to OFF. The APC indicator in the display window goes off.

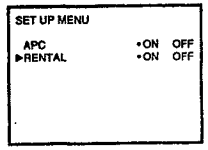
Note

- There is a delay of a few seconds before the VCR actually starts recording while the VCR analyses the tape. To avoid the delay, first set the VCR to recording pause (the APC indicator flashes slowly) and press ● REC to have the VCR analyse the tape. After the APC indicator stops flashing, press ❚❚ PAUSE to start recording immediately. If you press ❚❚ PAUSE before the APC indicator stops flashing, the APC function is cancelled.

continued

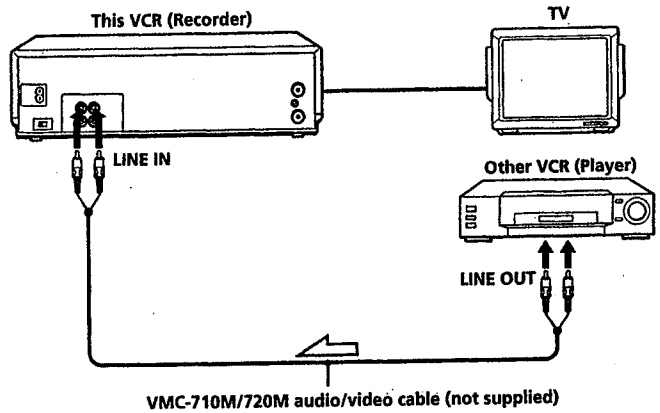
Reducing streaks and/or snow

If you are not satisfied with the picture quality while playing a tape, even when the APC is on, try setting RENTAL to ON in the SET UP MENU.



Editing with another VCR

How to connect to record on this VCR



: Signal flow

Notes

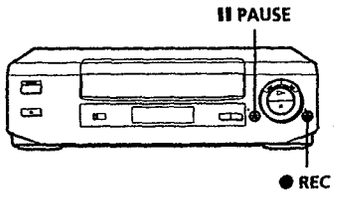
- Make sure you connect the plugs to jacks of the same colour.
- If you connect this VCR to both the LINE IN and LINE OUT jacks of the other VCR, select the input correctly to prevent a humming noise.

continued

1-17

Editing with another VCR (continued)

Operation (when recording on this VCR)



Before you start editing

- Turn on your TV and set it to the video channel.
- Press INPUT SELECT or PROG +/– to display "L" in the display window.

1 Insert a source tape with its safety tab removed into the other (playback) VCR. Search for the point to start playback and set it to playback pause.

2 Insert a tape with its safety tab in place into this (recording) VCR. Search for the point to start recording and press II PAUSE.

3 Press ● REC on this VCR and set it to recording pause.

4 To start editing, press the II PAUSE buttons on both VCRs at the same time.

To stop editing

Press the ■ STOP buttons on both VCRs.

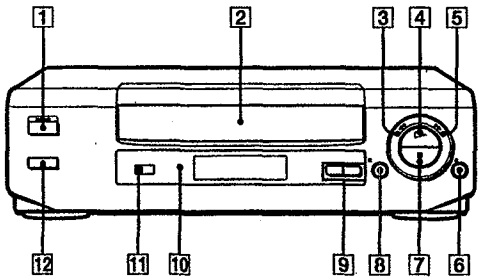
Note

- If you start recording following the procedure above, the VCR won't start recording with the APC function. To record a tape with the APC function, press ● REC again during recording pause in step 3 so that the VCR analyses the tape. Then when you start recording in step 4, press II PAUSE immediately after the APC indicator stops flashing. If you press II PAUSE before the APC indicator stops flashing, the APC function is cancelled.

Index to parts and controls

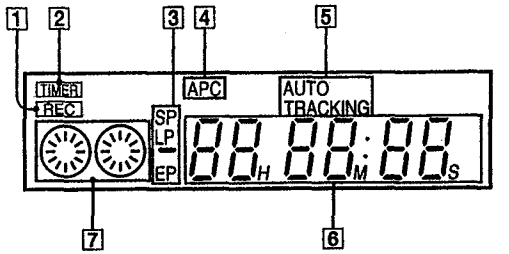
Refer to the pages indicated in parentheses ( ) for details.

Front panel



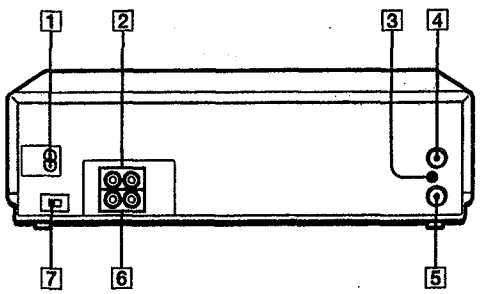
1 ON/STANDBY switch/indicator (7)
2 Tape compartment
3 ◀◀ REW button (20, 30)
4 ▷ PLAY button (30)
5 ▶▶ FF button (20, 30)
6 ● REC button (36)
7 ■ STOP button (36)
8 ❚❚ PAUSE button (36)
9 PROGRAM +/–/TRACKING ▼/▲ (STILL ADJUST) buttons (7, 30, 33)
10 Remote sensor (5)
11 COLOR SYSTEM switch (20)
12 ⏏ EJECT button (20)

Display window



1 REC (recording) indicator
2 TIMER indicator (26)
3 Tape speed indicator (23)
4 APC indicator (33)
5 AUTO TRACKING indicator (33)
6 Time counter/clock/line/programme position indicator (7, 21, 23)
7 Tape indicator

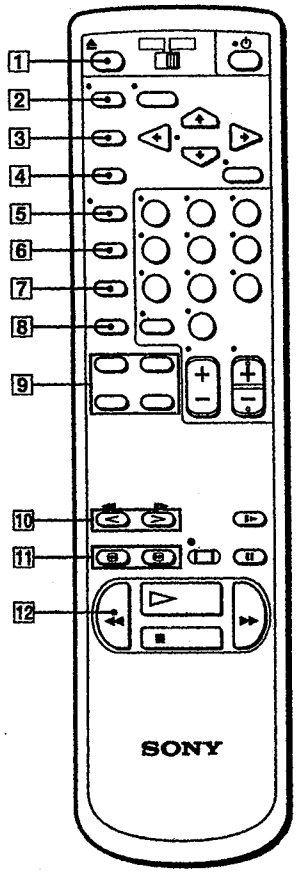
Rear panel



1 AC IN connector (6)
2 LINE IN AUDIO/VIDEO jacks (35)
3 RF CHANNEL screw (8)
4 AERIAL IN connector (6)
5 AERIAL OUT connector (6)
6 LINE OUT AUDIO/VIDEO jacks (6)
7 NTSC PB switch (20)

continued

Remote commander



1 ⏏ EJECT button (20)

2 TV/VIDEO button (only for a TV) (5)

3 TIMER CLEAR button (26, 32)

4 QUICK TIMER button (31)

5 DISPLAY button (21, 23)

6 COUNTER RESET button (21)

7 INPUT SELECT button (24, 36)

8 TAPE SPEED button (23)

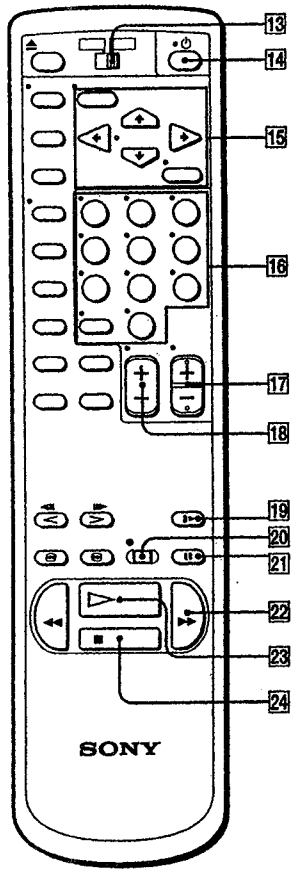
9 G-CODE buttons (25, 26)

G-CODE button
ONCE button
DAILY button
WEEKLY button

10 ◄II/II► FRAME buttons (30)

11 ⏪/⏩ SEARCH buttons (20)

12 ◄◄ REW button (20)



13 TV/VTR remote control switch (5)

14 ⏻ (on/standby) switch (29)

15 Menu operation buttons (9)

MENU button
CURSOR ↑/↓/←/→ buttons
EXECUTE button

16 Programme number/ -/-- (ten's digit) buttons (17, 24)

17 PROG +/– buttons (14, 23)

18 VOL +/– buttons

19 ▮► SLOW button (30)

20 ● REC button (23)

21 II PAUSE button (20)

22 ►► FF button (20)

23 ▷ PLAY button (20)

24 ■ STOP button (20)

1-19E

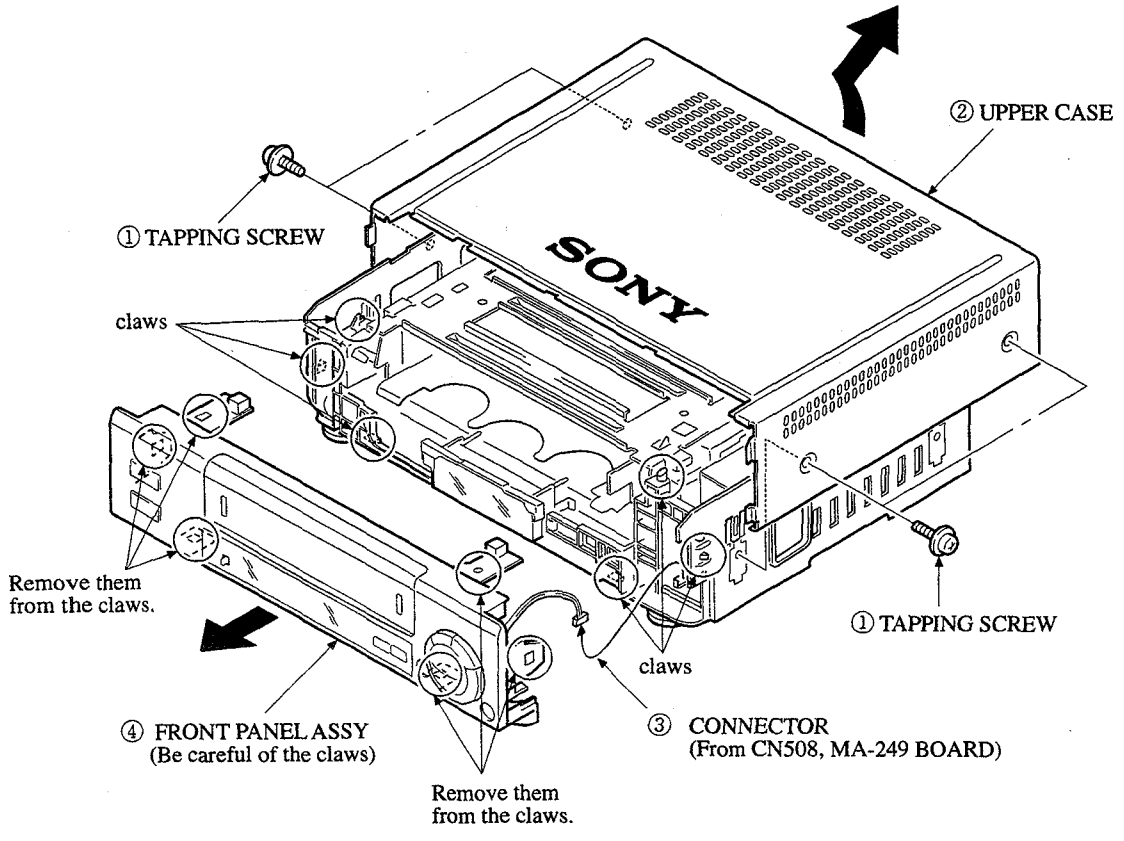
SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/ X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA

SECTION 2

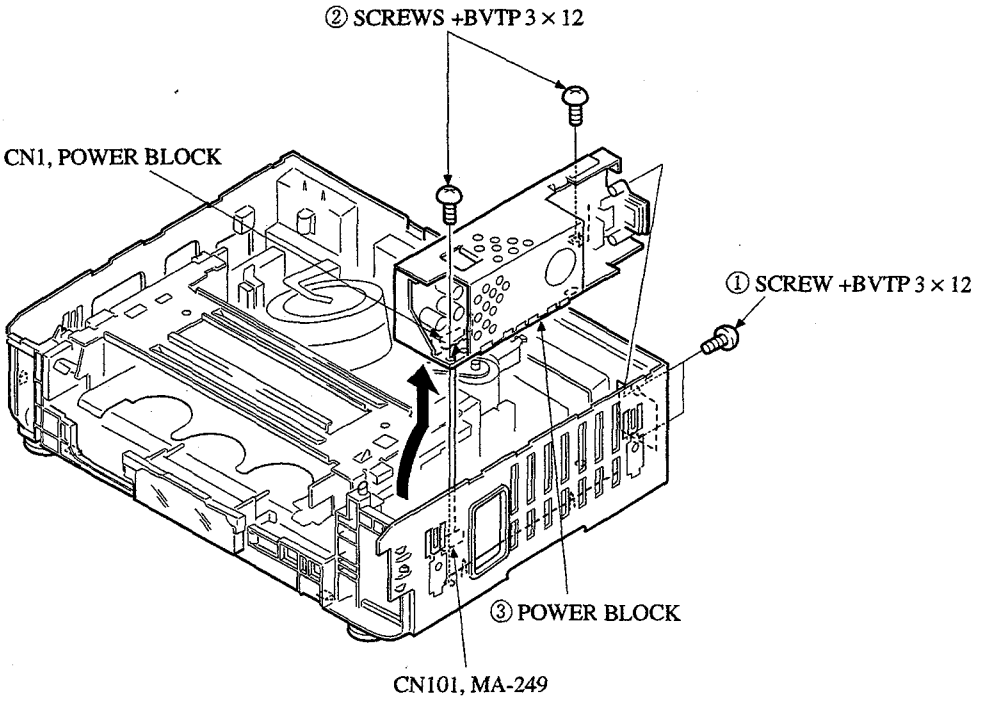
DISASSEMBLY

NOTE : Follow the disassembly procedure in the numerical order given.

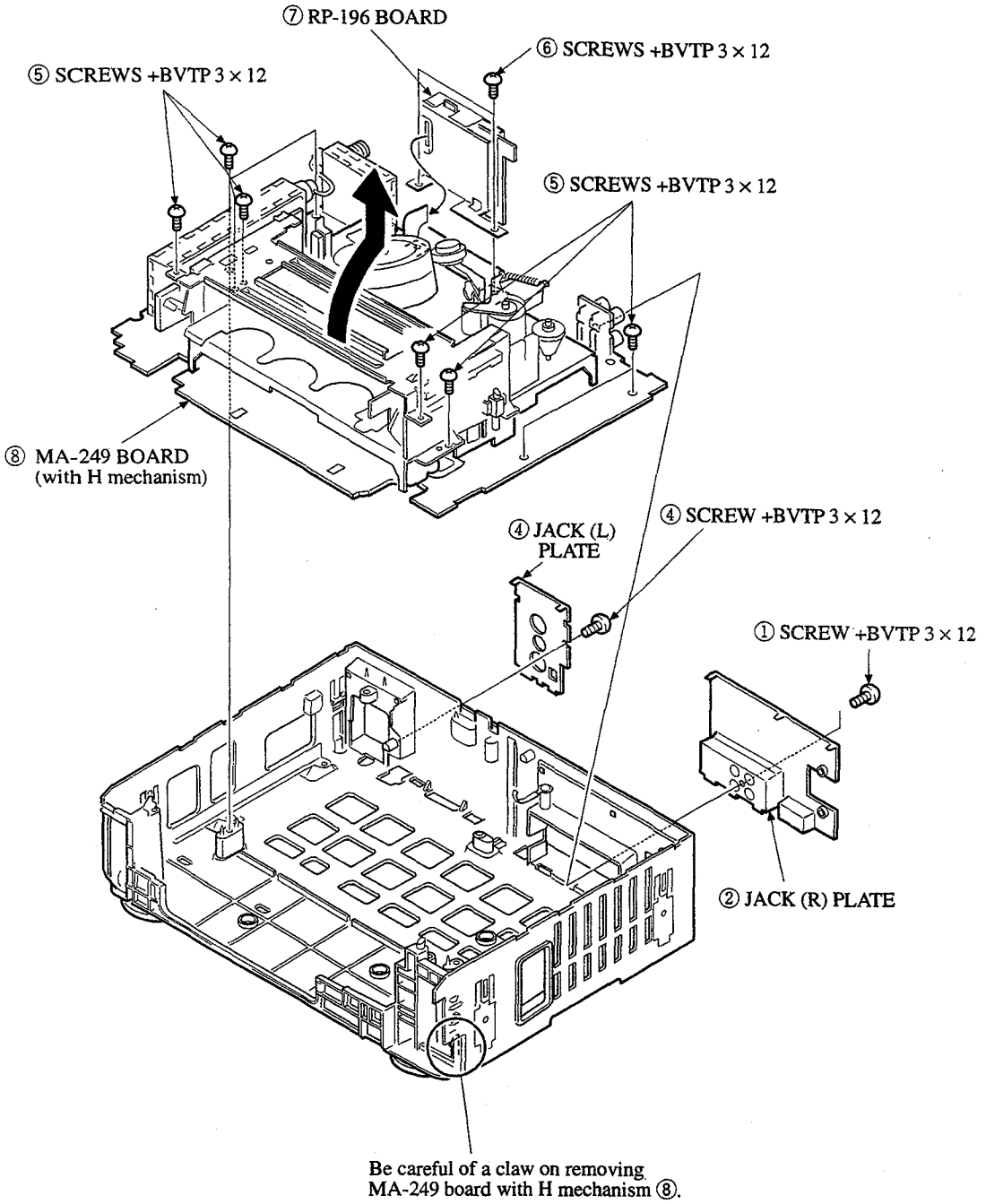
2-1. REMOVAL OF FRONT PANEL ASSY



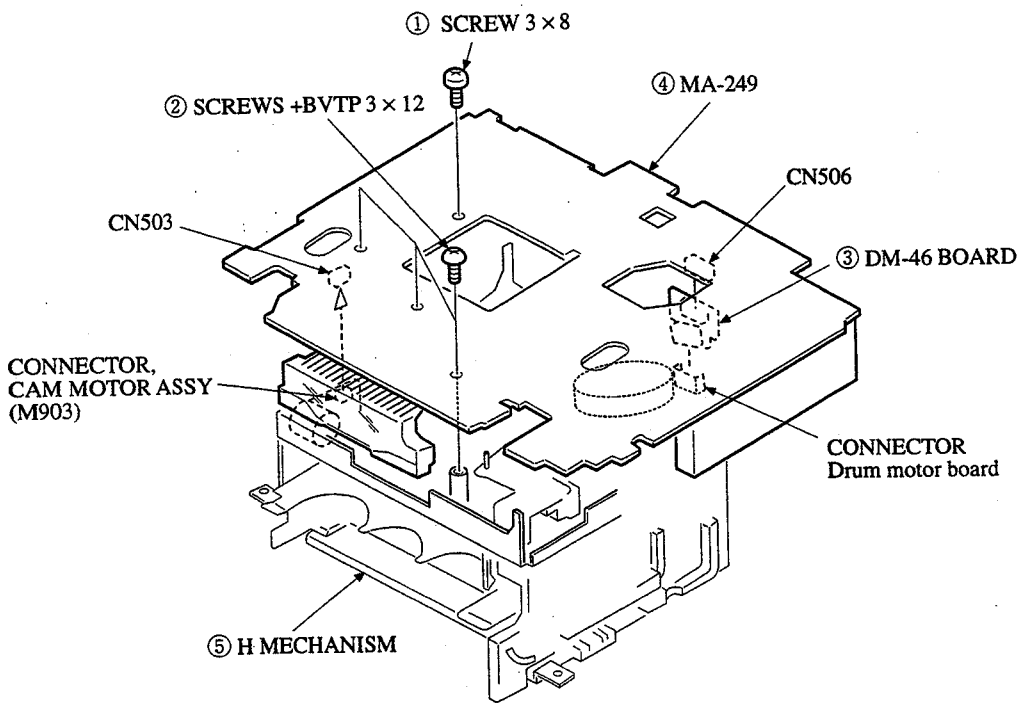
2-2. REMOVAL OF POWER BLOCK



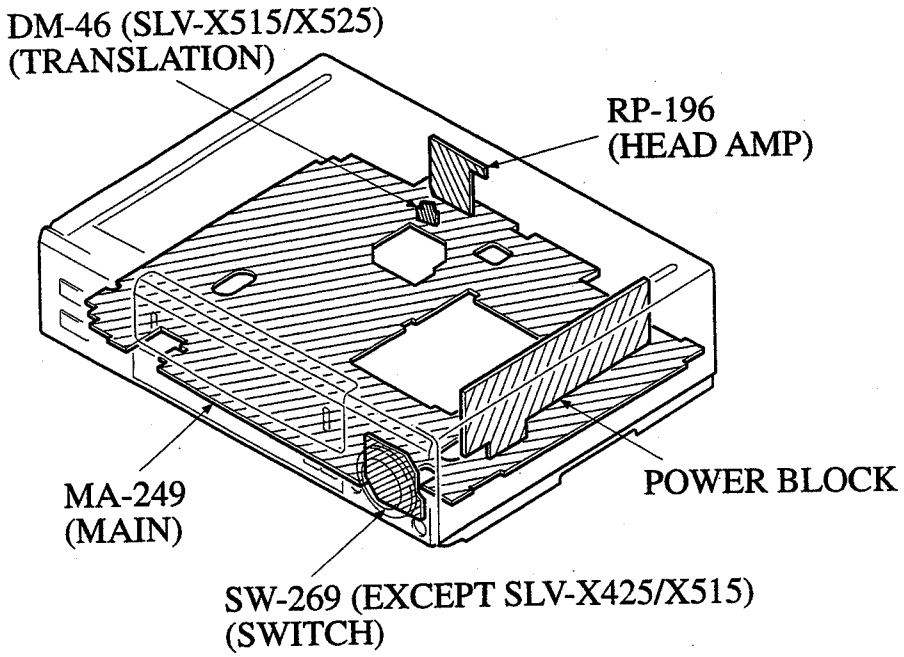
2-3. REMOVAL OF RP-196 BOARD and MA-249 BOARD


⑦ RP-196 BOARD
⑥ SCREWS +BVTP 3 × 12
⑤ SCREWS +BVTP 3 × 12
⑤ SCREWS +BVTP 3 × 12
⑧ MA-249 BOARD
(with H mechanism)
④ JACK (L)
PLATE
④ SCREW +BVTP 3 × 12
① SCREW +BVTP 3 × 12
② JACK (R) PLATE
Be careful of a claw on removing
MA-249 board with H mechanism ⑧.

2-4. REMOVAL OF H MACHANISM

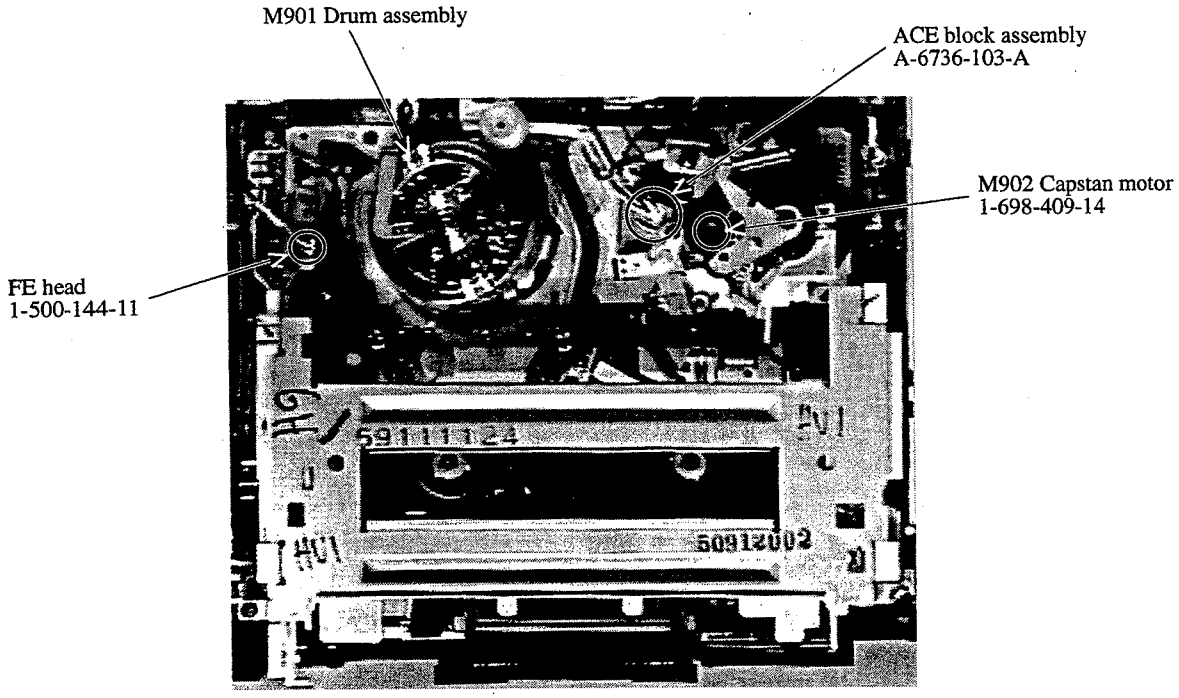


2-5. CIRCUIT BOARDS LOCATION

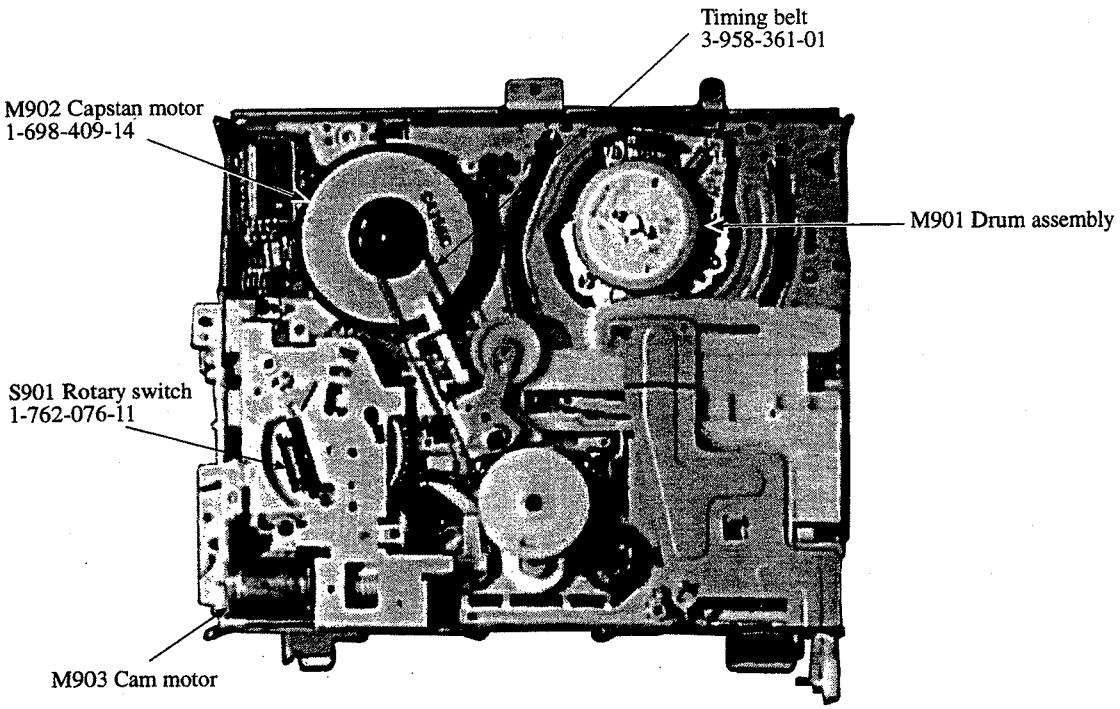


2-6. INTERNAL VIEWS

— Top view —

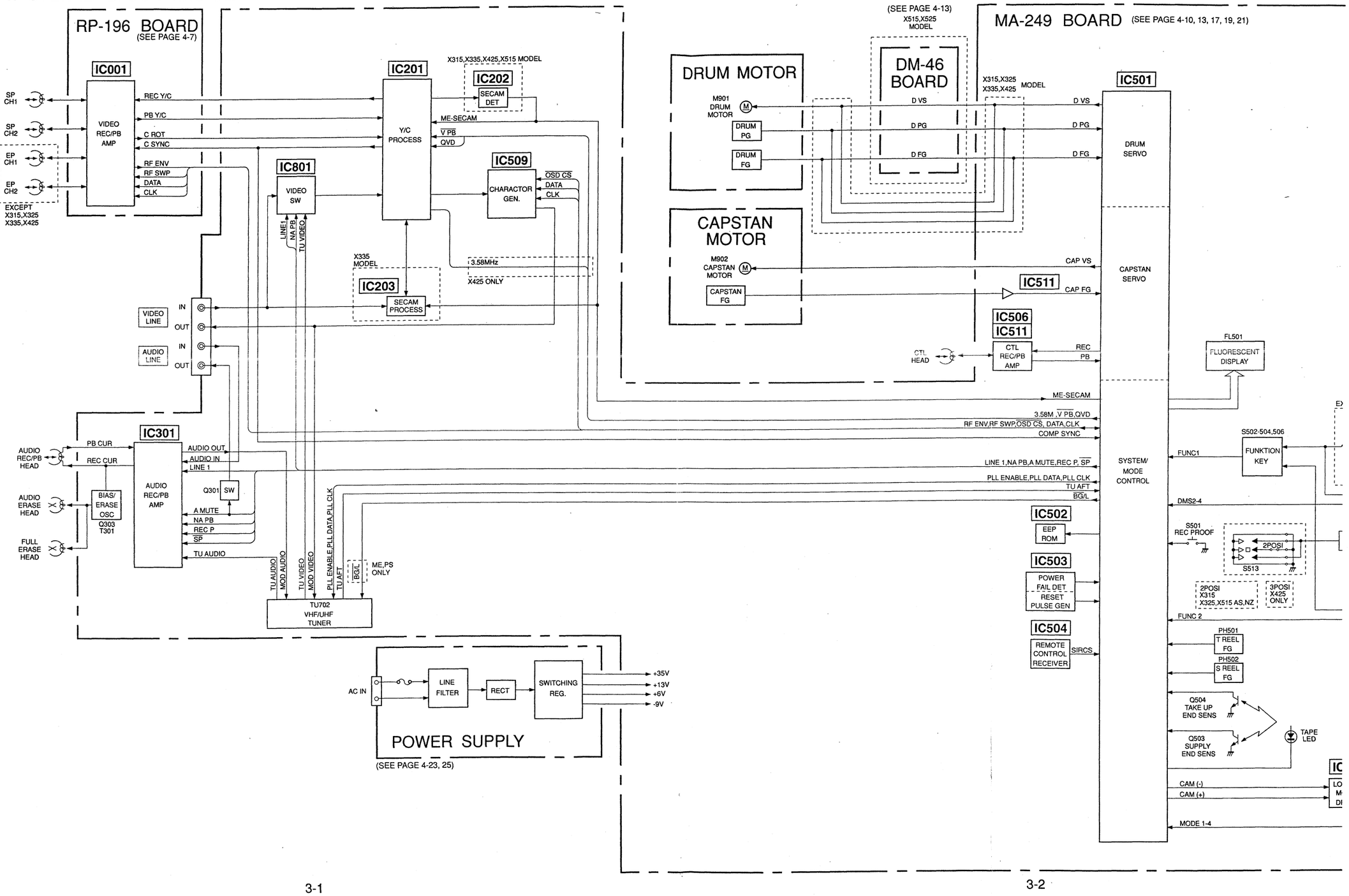


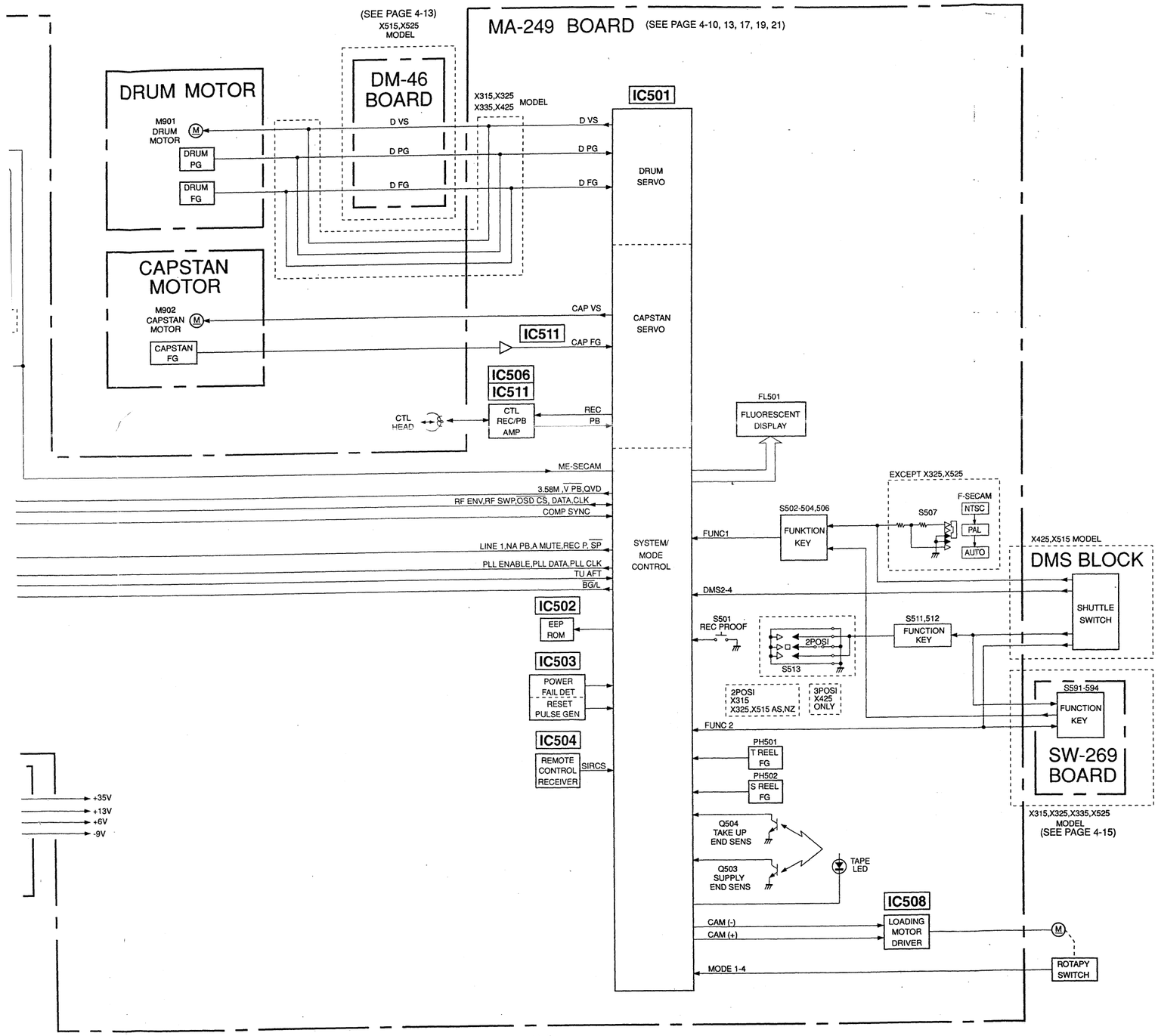
— Bottom view —



SECTION 3
BLOCK DIAGRAM

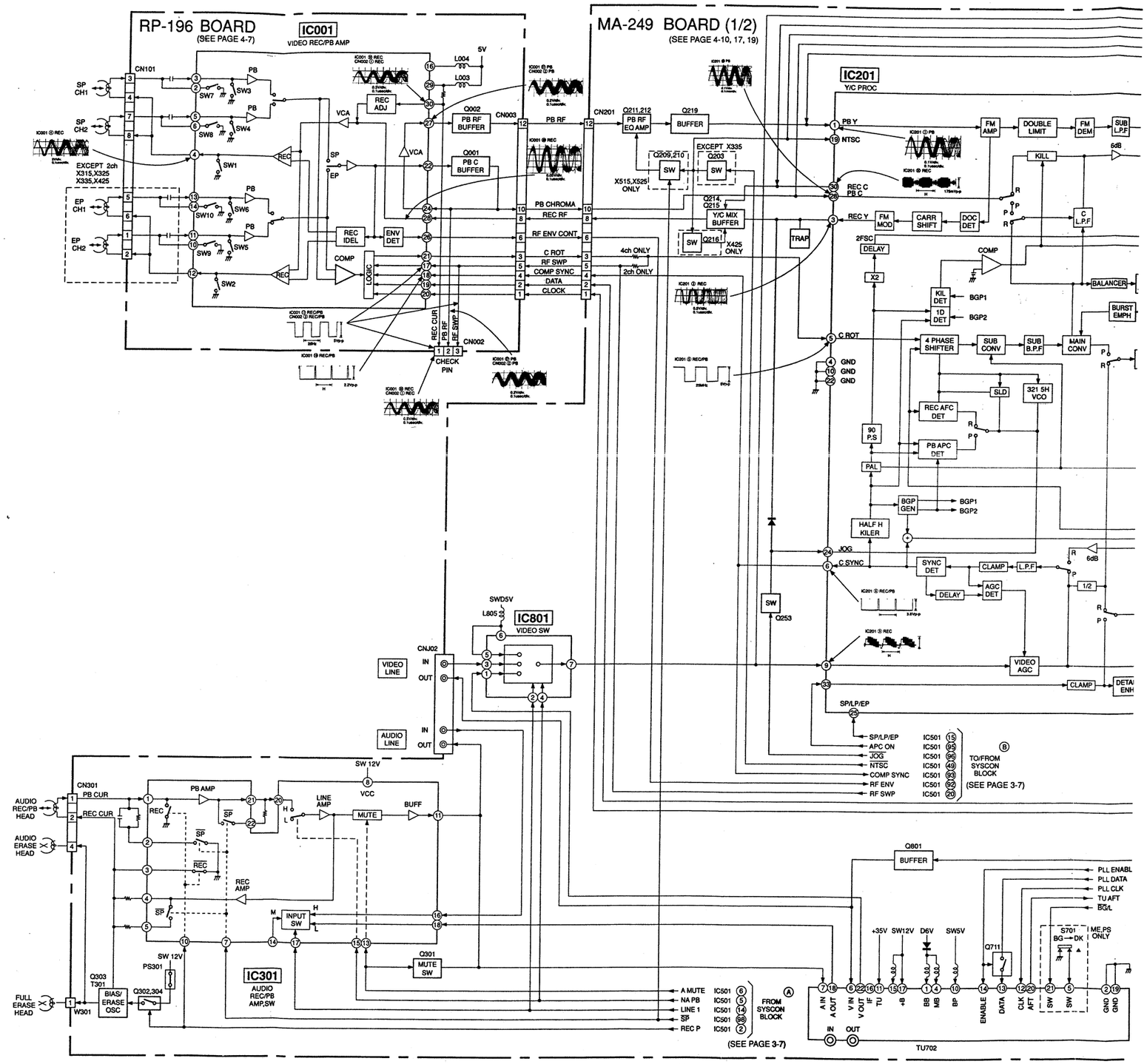
3-1. OVERALL BLOCK DIAGRAM




(SEE PAGE 4-13)
X515,X525 MODEL
DM-46 BOARD
MA-249 BOARD (SEE PAGE 4-10, 13, 17, 19, 21)
DRUM MOTOR
M901 DRUM MOTOR
DRUM PG
DRUM FG
X315,X325 X335,X425 MODEL
D VS
D PG
D FG
IC501
DRUM SERVO
CAPSTAN MOTOR
M902 CAPSTAN MOTOR
CAPSTAN FG
CAP VS
CAP FG
IC511
CAPSTAN SERVO
IC506
IC511
CTL HEAD
CTL REC/PB AMP
REC
PB
FL501
FLUORESCENT DISPLAY
ME-SECAM
3.58M ,V PB,QVD
RF ENV,RF SWP,OSD CS, DATA,CLK
COMP SYNC
LINE 1,NA PB,A MUTE,REC P, SP
PLL ENABLE,PLL DATA,PLL CLK
TU AFT
BG/L
SYSTEM/ MODE CONTROL
EXCEPT X325,X525
F-SECAM
NTSC
PAL
AUTO
S507
S502-504,506
FUNKTION KEY
FUNC1
X425,X515 MODEL
DMS BLOCK
SHUTTLE SWITCH
DMS2-4
IC502
EEP ROM
S501 REC PROOF
2POSI
S513
S511,512
FUNCTION KEY
IC503
POWER FAIL DET
RESET PULSE GEN
2POSI X315 X325,X515 AS,NZ
3POSI X425 ONLY
S591-594
FUNCTION KEY
FUNC 2
SW-269 BOARD
IC504
REMOTE CONTROL RECEIVER
SIRCS
PH501
T REEL FG
PH502
S REEL FG
+35V
+13V
+6V
-9V
Q504 TAKE UP END SENS
Q503 SUPPLY END SENS
TAPE LED
X315,X325,X335,X525 MODEL
(SEE PAGE 4-15)
IC508
CAM (-)
CAM (+)
LOADING MOTOR DRIVER
MODE 1-4
ROTAPY SWITCH

SLV-X315ME/X315PS/X325AS/X325NZ/X325SA/X335AF/X425ME/ X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA

3-2. VIDEO, AUDIO, TUNER BLOCK DIAGRAM



MA-249 BOARD (1/2)

(SEE PAGE 4-10, 17, 19)

IC001
VIDEO REC/PB AMP

IC201
Y/C PROC

IC203
SECAM PROCESS

IC202
SECAM DET

IC801
VIDEO SW

IC509
CHARACTER GEN.

REC ADJ, VCA, SP, EP, REC, REC IDEL, ENV DET, COMP, LOGIC, REC CUR, PB RF, RF SWP, CHECK PIN, CN002, CN003, Q002 PB RF BUFFER, Q001 PB C BUFFER, PB RF, PB CHROMA, REC RF, RF ENV CONT, C ROT, RF SWP, COMP SYNC, DATA, CLOCK, L004, L003, 5V

CN201, Q211,212 PB RF EQ AMP, Q219 BUFFER, EXCEPT X335 Q203 SW, Q209,210 SW, X515,X525 ONLY, Q214, Q215 Y/C MIX BUFFER, SW Q216, X425 ONLY, 4ch ONLY, 2ch ONLY, TRAP

PB Y, NTSC, REC C PB C, REC Y, C ROT, GND GND GND, FM AMP, DOUBLE LIMIT, FM DEM, SUB L.P.F, MAIN DEEMPH, KILL, 6dB, BG P1, PB AMP, B DEEM, KILLER, NAP, FSC B.P.F, FM MOD, CARR SHIFT, DOC DET, C L.P.F, 2FSC, DELAY, X2, COMP, KIL DET, 1D DET, BGP1, BGP2, BALANCER, ACC AMP, ACC DET, BURST EMPH, BG, SW1, REC NTSC, PB ALL, REC NTSC, L.P.F, MESECAM, 6dB, 4 PHASE SHIFTER, SUB CONV, SUB B.P.F, MAIN CONV, FSC B.P.F, DLED, SLD, 321 5H VCO, REC AFC DET, PB APC DET, 90 P.S, PAL, BGP GEN, HALF H KILER, JOG, C SYNC, SYNC DET, CLAMP, L.P.F, AGC DET, DELAY, SW Q253, VIDEO AGC, 1/2, Y L.P.F, LIM, K2, K1, CORR, DOC, NOR, REC, NL DEEMPH, WHP NOICAN, PICTURE CONT, Y/C MIC, CHROMA TRAP, 4.2V, REG, CLAMP, QV/OH 1NS CHARA 1NS W/D CLIP, VIDEO AMP, VIDEO OUT, DETAIL ENH, NL EMPH, MAIN EMPF, W/D CLIP, EMPH OUT, SP/LP/EP, Y NR, NOICAN, SHARPNESS, Q290 BUFFER, PB IN, DE-EMPH, PB C OUT, FSC1, FSC2, BGP, 3rd LOCK PROTECT, VXO, XO, SW2, SW3, 3.58MHz/LP JOG, X425 ONLY, (SEE PAGE 3-7)

5V(CCD), 5V(C), 5V(Y), L203, L206, L202, 1.1M TRAP, Q202 SW, Q021, Q205 PB 5V SW, PB 5V, PB, ACK IN, SECAM, ME SECAM, REC C, 1/4, VIDEO IN, NTSC, PB C IN, X4, PB C OUT, X335 MODEL, FROM SYSCON (SEE PAGE 3-7) BLOCK, SECAM, V PB, PAL 60, NT JUDGE, ME-SECAM, NTSC PB, ACK, ME-SECAM, IC501 13, 99, 78, 50, 1

Q220 BUFFER, SW LIM AMP, FO PHASE CONV, PD1, SHL, TIMING GEN., 1H DL, PD2, L.P.F, COMP, L205, C OUT, X315,X335,X425,X515 MODEL

SWD5V, L805, SW 12V, VCC, VIDEO LINE IN, VIDEO LINE OUT, AUDIO LINE IN, AUDIO LINE OUT, CNJ02, LINE AMP, MUTE, BUFF, INPUT SW, Q301 MUTE SW, A MUTE, NA PB, LINE 1, SP, REC P, IC501 8, 5, 14, 98, 2, FROM SYSCON BLOCK (A), (SEE PAGE 3-7)

Q801 BUFFER, PLL ENABLE, PLL DATA, PLL CLK, TU AFT, BG/L, IC501 10, 7, 8, 85, 12, TO/FROM SYSCON BLOCK (F), (SEE PAGE 3-7), +35V, SW12V, D6V, SW5V, Q711, S701 BG→DK ME,PS ONLY, A IN, A OUT, V IN, V OUT, IF, TU, +B, BB, MB, BP, ENABLE, DATA, CLK, AFT, SW, SW, GND, GND, IN, OUT, TU702, VHF/UHF

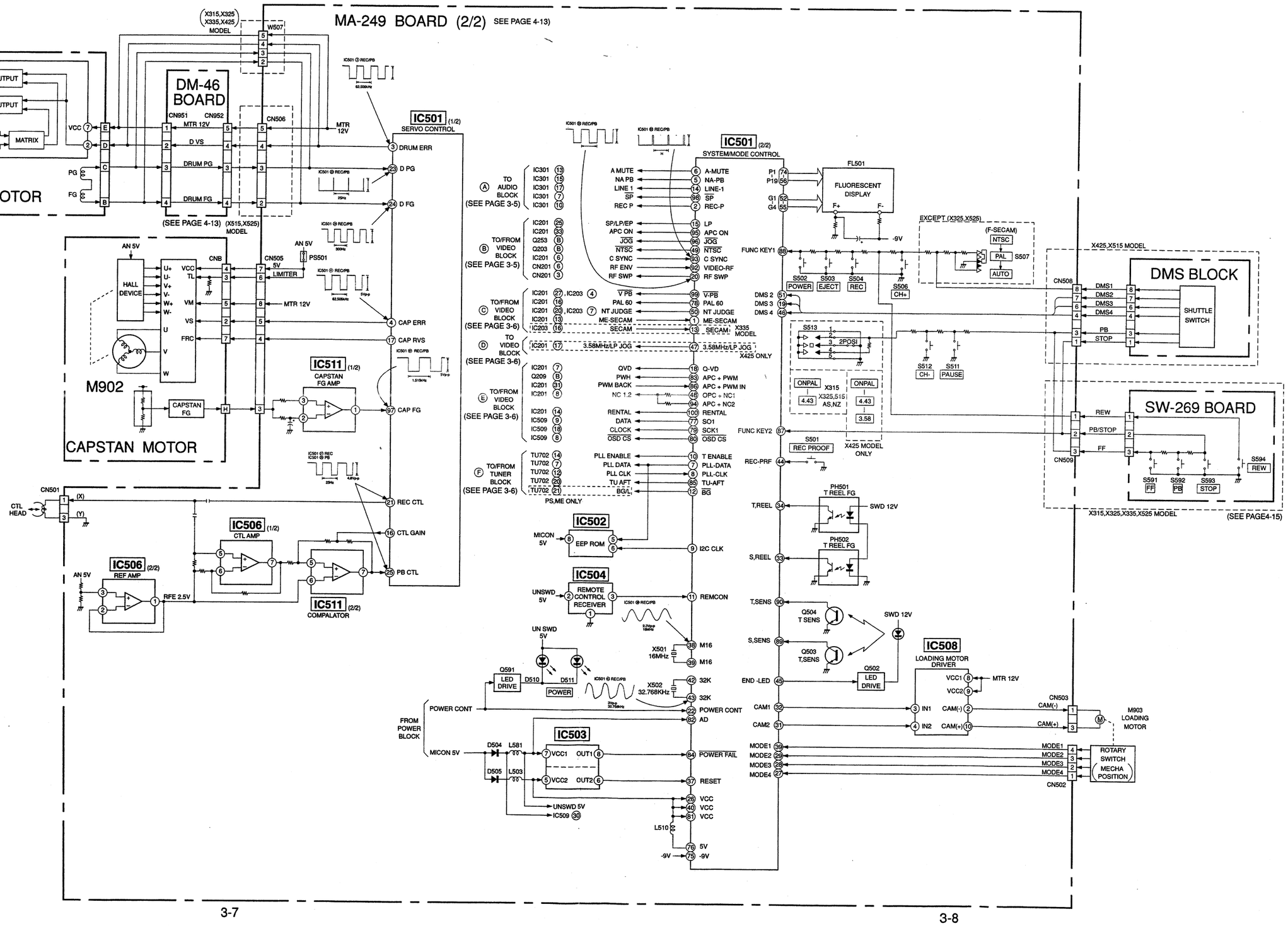
SP/LP/EP, APC ON, JOG, NTSC, COMP SYNC, RF ENV, RF SWP, IC501 15, 95, 96, 49, 93, 82, 20, TO/FROM SYSCON BLOCK (B), (SEE PAGE 3-7)

QVD, PWM, IC501 18, 83, PWM BACK, NC1,2, RENTAL, IC501 86, 48, 94, 100, TO/FROM SYSCON BLOCK (E), (SEE PAGE 3-7)

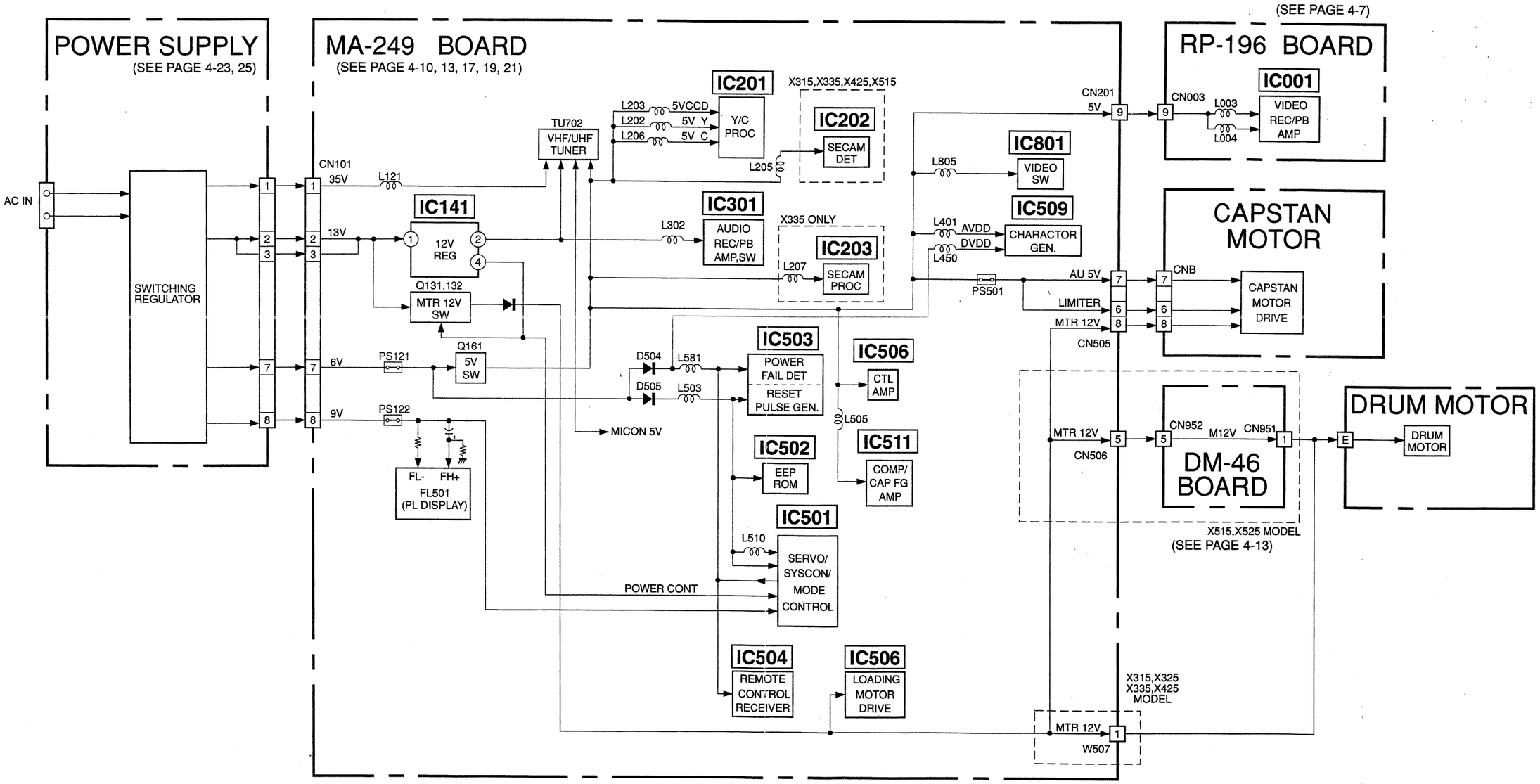
DATA, CLOCK, OSD CS, IC501 77, 79, 80

AN 5V, MICON 5V, L401, L450, A VDD, D VDD, RST, CV OUT, XI 2, XO 2, VCO O, VCO I, T401, LC FILTER, X541 7MHz, Q401 BUFFER, Q403 BUFFER, SYNC IN, S IN, S CLK, CS, CV IN

3-3. SERVO, SYSTEM CONTROL BLOCK DIAGRAM



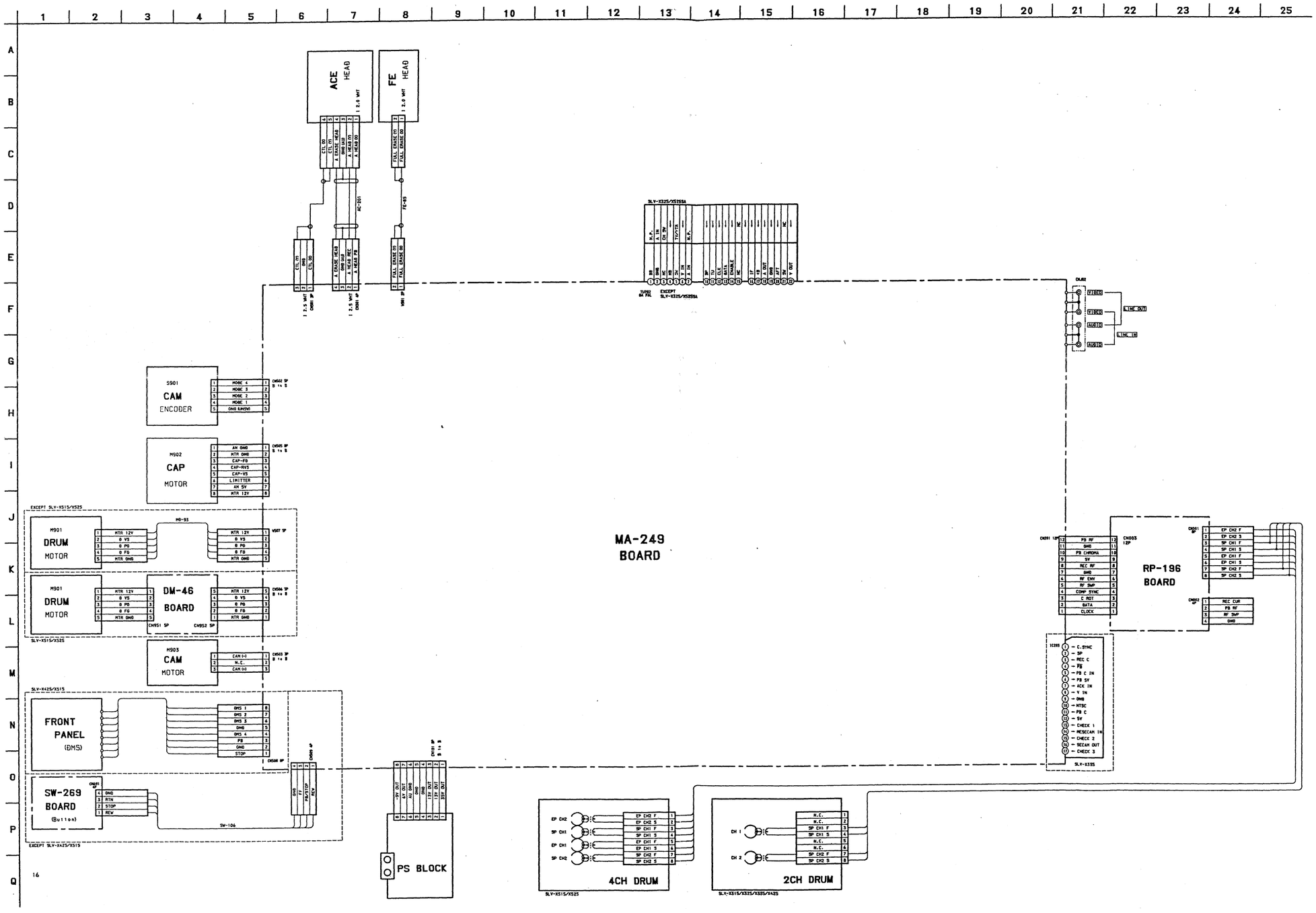
3-4. POWER SUPPLY BLOCK DIAGRAM

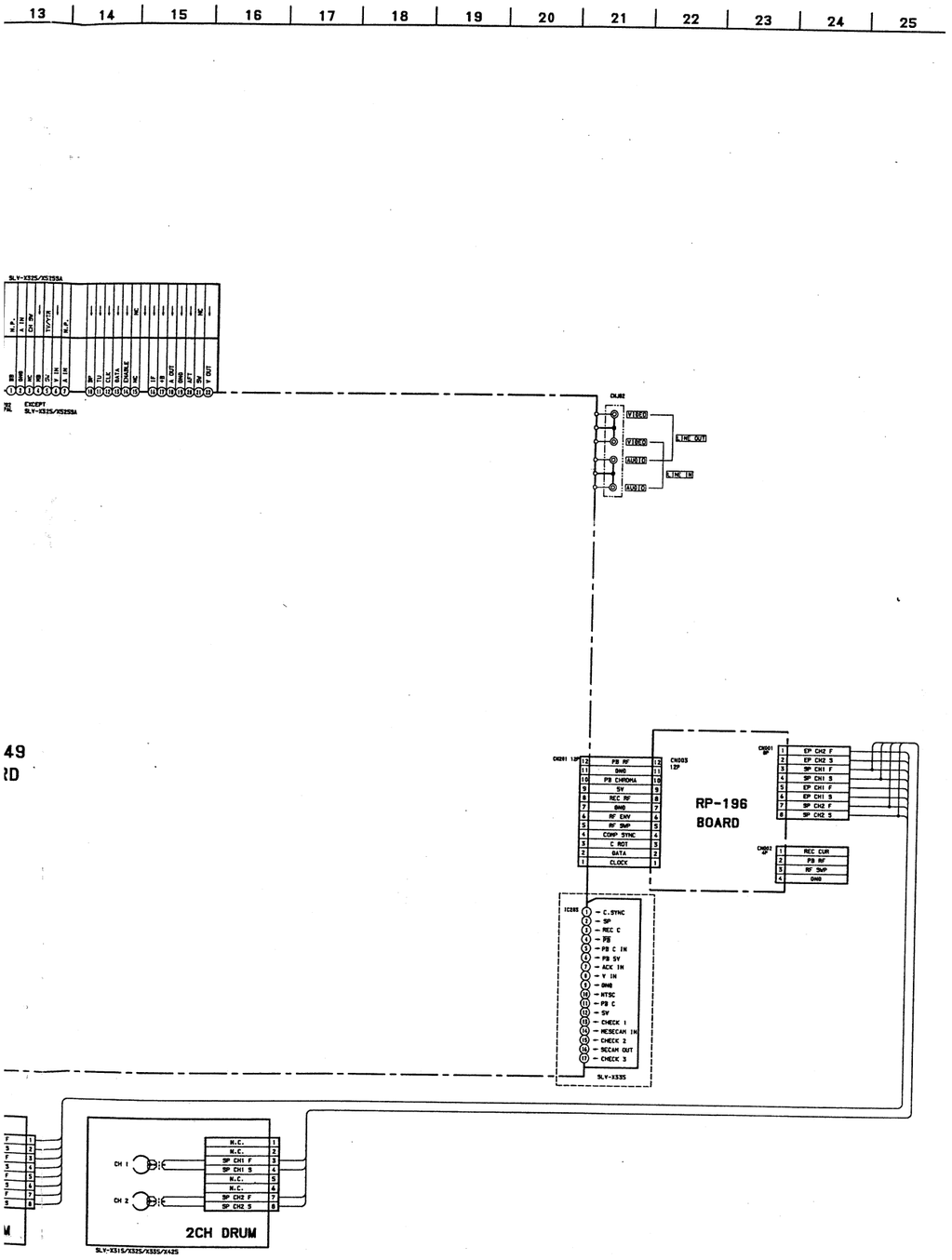


SECTION 4

PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

4-1. FRAME SCHEMATIC DIAGRAM





4-2. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

THIS NOTE IS COMMON FOR PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS.
(In addition to this, the necessary note is printed in each block.)

For printed wiring boards:

- ○ : Through hole is omitted.
- ▬ : Pattern from the side which enables seeing.
- ▬ : Pattern of the rear side.*

*Caution:	
Pattern face side: (Conductor Side)	Parts on the pattern face side seen from the pattern face are indicated.
Pattern face side: (Component Side)	Parts on the parts face side seen from the parts face are indicated.

For schematic diagram:

- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minus side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, 1/4 W unless otherwise noted.
  Chip resistors: 1/10 W unless otherwise noted.
  kΩ: 1000kΩ, MΩ: 1000KΩ.
- All capacitors are in μF unless otherwise noted. pF: μ μF.
  50V or less are not indicated except for electrolytics and tantalums.
- ▭ : panel designation.
- △ : internal component
- ▬ : B+Line.*
- ▬ ▬ : B-Line.*
- ▨ : IN/OUT direction of B line (+, -).*
- Circled numbers refer to wavwforms.*
- Readings are taken with a PAL color-bar signal input.
- Voltage are dc between ground and measurement points.*
- Readings are taken with a digital multimeter (DC10MΩ).*
- Voltage variations may be noted due to normal production tolerances.*

When indicating parts by reference number, please include the board name.

- *: indicated by the color red.

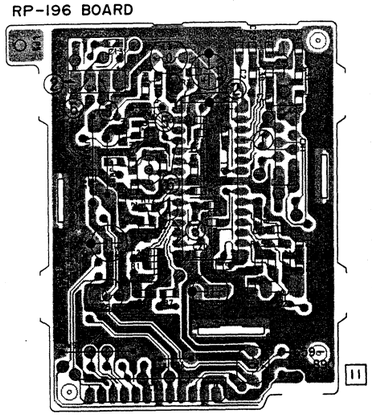
FRAME SCHEMATIC DIAGRAM

SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/ X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA

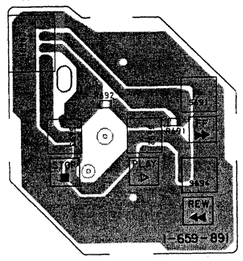
MA-249 (MAIN), RP-196 (HEAD AMP), SW-269 (SWITCH), DM-46 (TRANSLATION) PRINTED WIRING BOARDS

— Ref. No. : MA-249 Board: 1,000 Series, RP-196 Board: 2,000 Series, SW-269 Board: 2,000 Series, DM-46 Board: 1,000 Series —

RP-196 BOARD



SW-269 BOARD



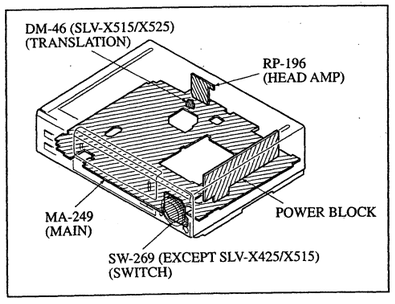
16

MA-249 BOARD

CN101	G-1	IC504	J-9	Q131	D-2
CN201	A-8	IC506	G-13	Q132	D-2
CN301	D-12	IC508	H-1	Q161	E-2
CN501	H-13	IC509	C-6	Q201	A-5
CN502	G-3	IC511	G-12	Q202	A-9
CN503	H-3	IC801	C-4	Q203	C-9
CN505	E-3			Q205	B-7
CN506	C-8			Q209	B-9
CN508	I-1			Q210	B-9
CN509	J-2			Q211	B-9
				Q212	B-9
D131	D-2			Q214	B-8
D161	E-1			Q215	B-8
D162	E-1			Q216	C-8
D202	B-8			Q219	B-10
D301	D-11			Q220	C-11
D302	D-11			Q253	D-9
D503	F-7			Q290	F-11
D504	I-6			Q301	D-11
D505	I-6			Q302	E-12
D506	G-11			Q303	F-12
D507	G-7			Q304	E-11
D508	G-8			Q401	C-7
D510	J-13			Q403	D-7
D511	J-13			Q502	G-6
D701	C-12			Q503	F-11
D702	B-12			Q504	F-2
D809	B-2			Q591	I-13
				Q711	D-13
IC141	D-1			Q801	B-5
IC201	B-10				
IC202	C-11				
IC203	A-7				
IC301	D-11				
IC501	F-8				
IC502	H-9				
IC503	H-10				

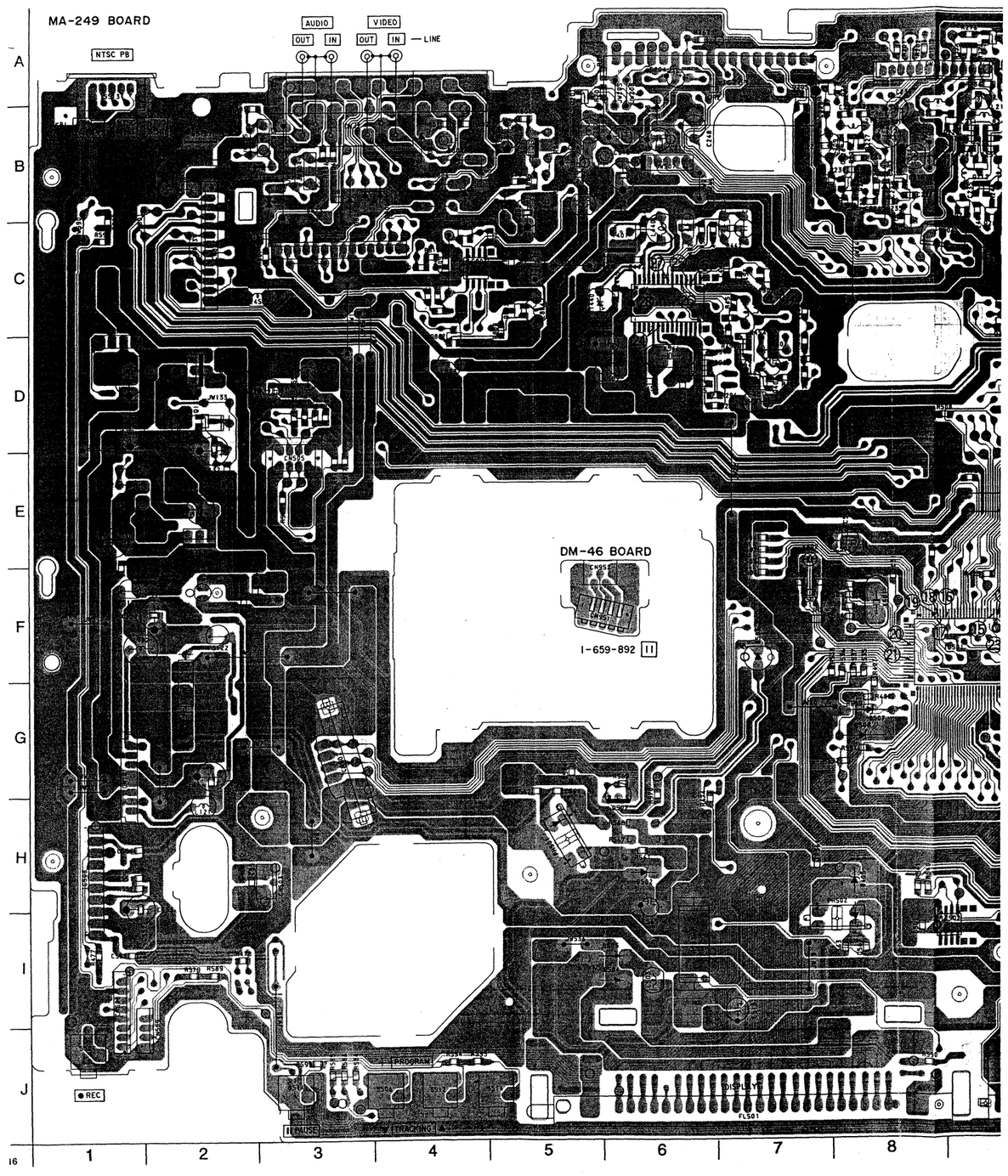
DM-46 BOARD

CN951	F-5
CN952	F-5



MAIN
MA-249/RP-196/SW-269/DM-46

MA-249 BOARD



MA-249 BOARD

NTSC PB

AUDIO OUT IN

VIDEO OUT IN — LINE

TV SYSTEM K — G

AERIAL

DM-46 BOARD

1-659-892 [11]

1-659-889 [11]

● REC

ON/STANDBY

EJECT

A B C D E F G H I J

1 2 3 4 5 6 7 8 9 10 11 12 13

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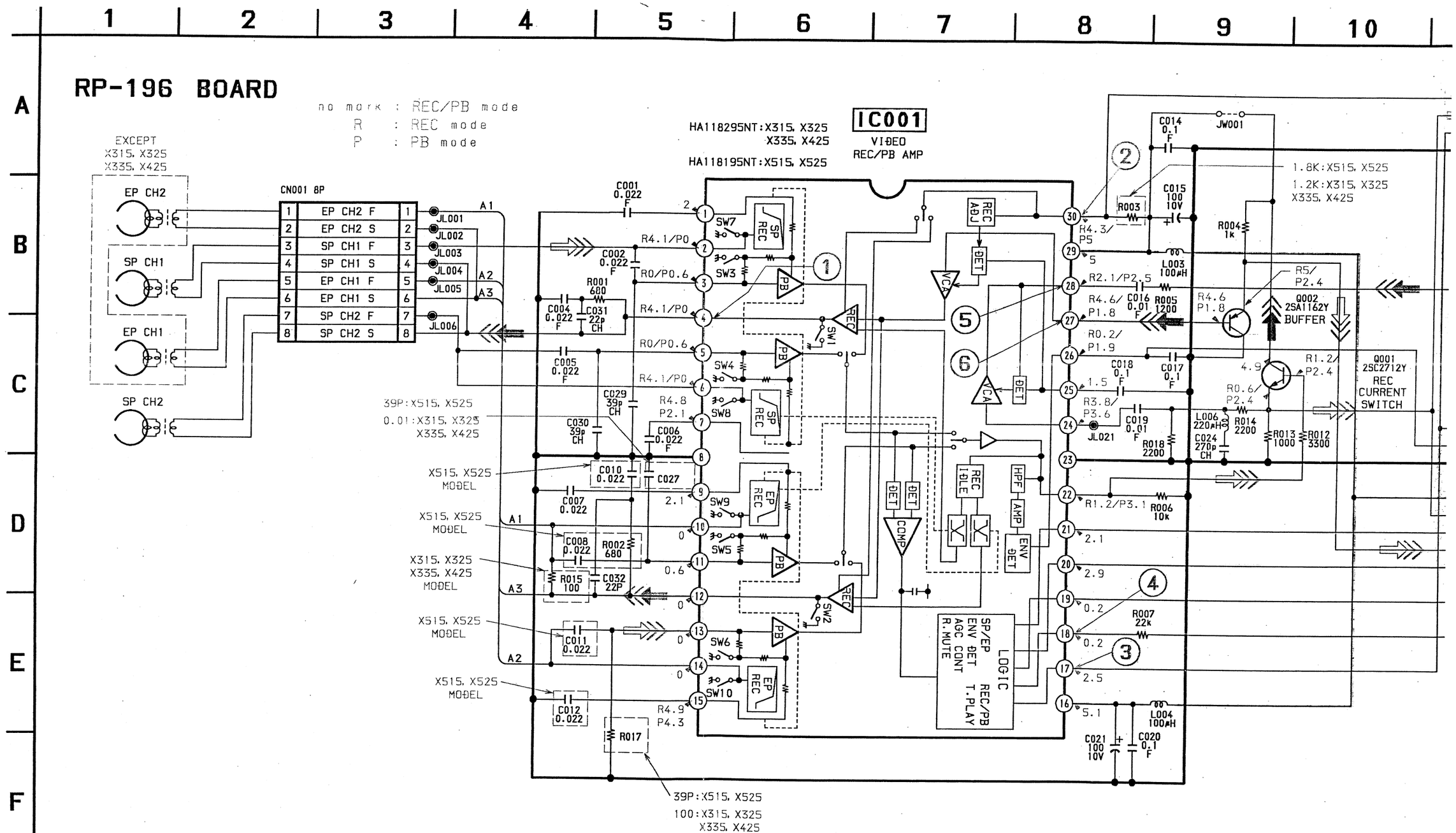
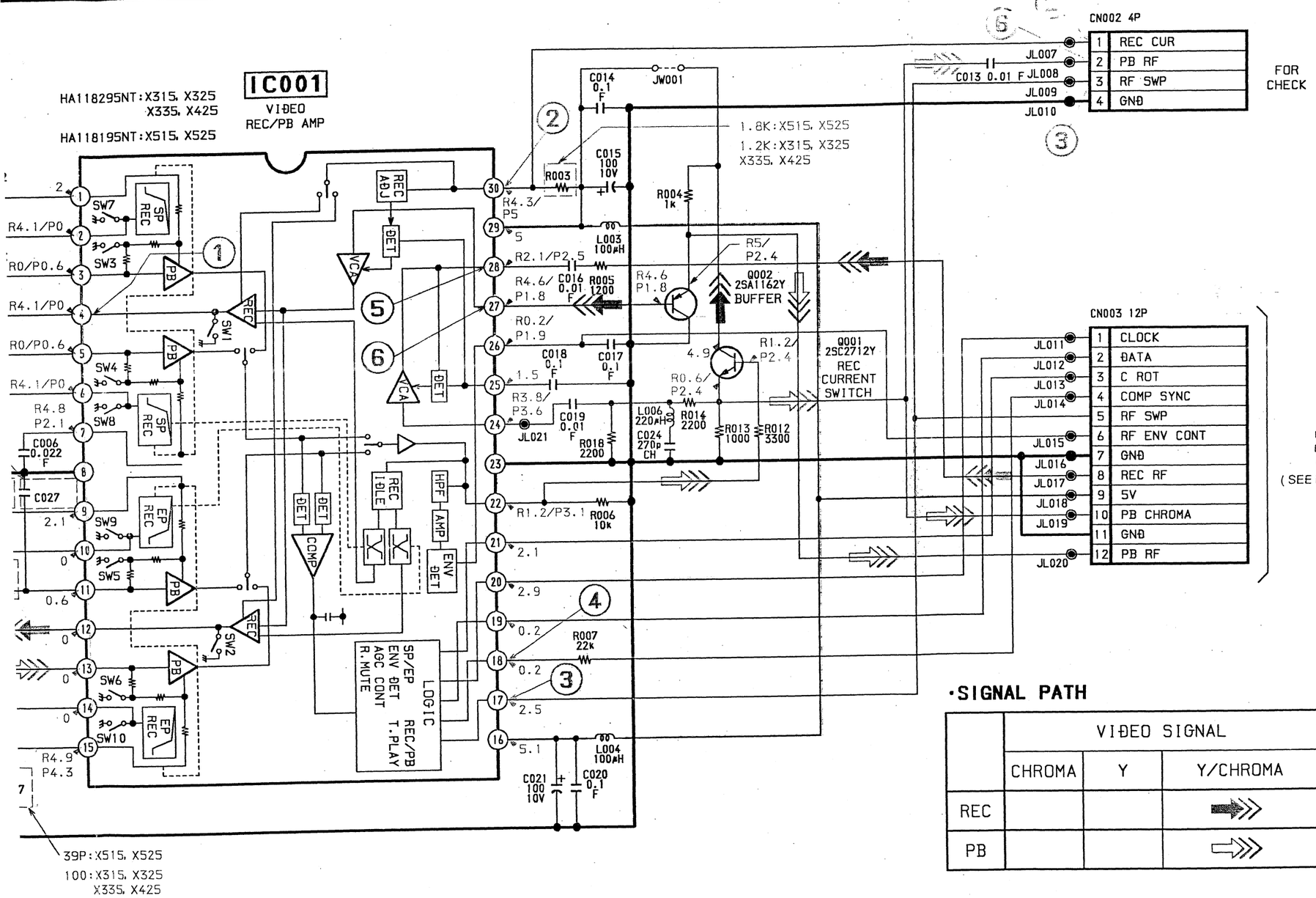
RP-196 (HEAD AMP) SCHEMATIC DIAGRAM

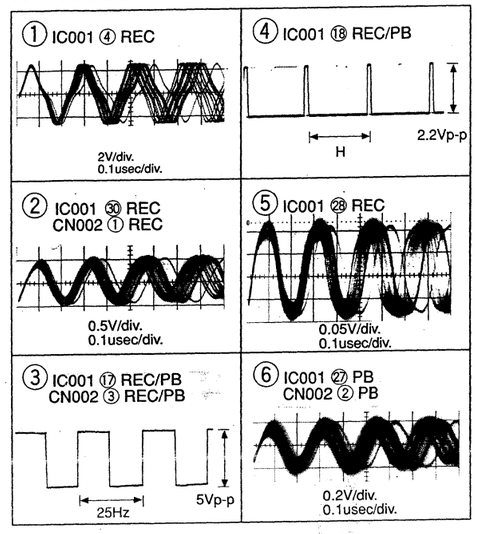
— Ref. No. : RP-196 Board: 2,000 Series —



5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13



RP-196 BOARD



·SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			⇛	
PB			⇛	

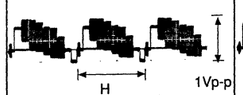
MA-249 (VIDEO) SCHEMATIC DIAGRAM

— Ref. No. : MA-249 Board: 1,000 Series —

• See page 4-4 to 4-6 for the printed wiring board.

MA-249 BOARD

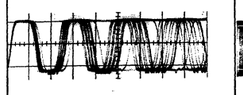
① IC201 ⑨ REC



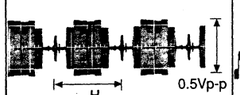
⑤ IC201 ⑪ PB
IC509 ⑯,⑱ PB

⑨ IC201 ㉞ REC

② IC201 ③ REC

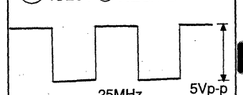


⑥ IC201 ㉑ REC



⑨ IC201 ㉞ PB

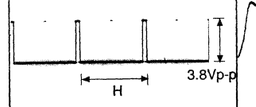
③ IC201 ⑤ REC/PB



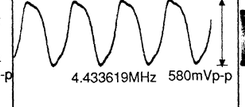
⑥ IC201 ㉑ PB

⑩ IC201 ① PB

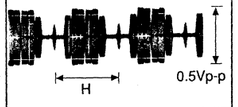
④ IC201 ⑥ REC/PB



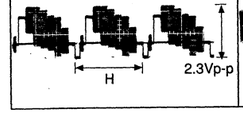
⑦ IC201 ㉓ REC/PB



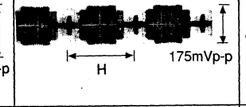
⑪ IC201 ⑮ PB



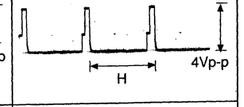
⑤ IC201 ⑪ REC
IC509 ⑯,⑱ REC



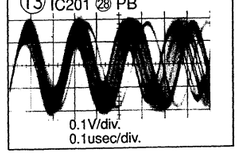
⑧ IC201 ㉚ REC

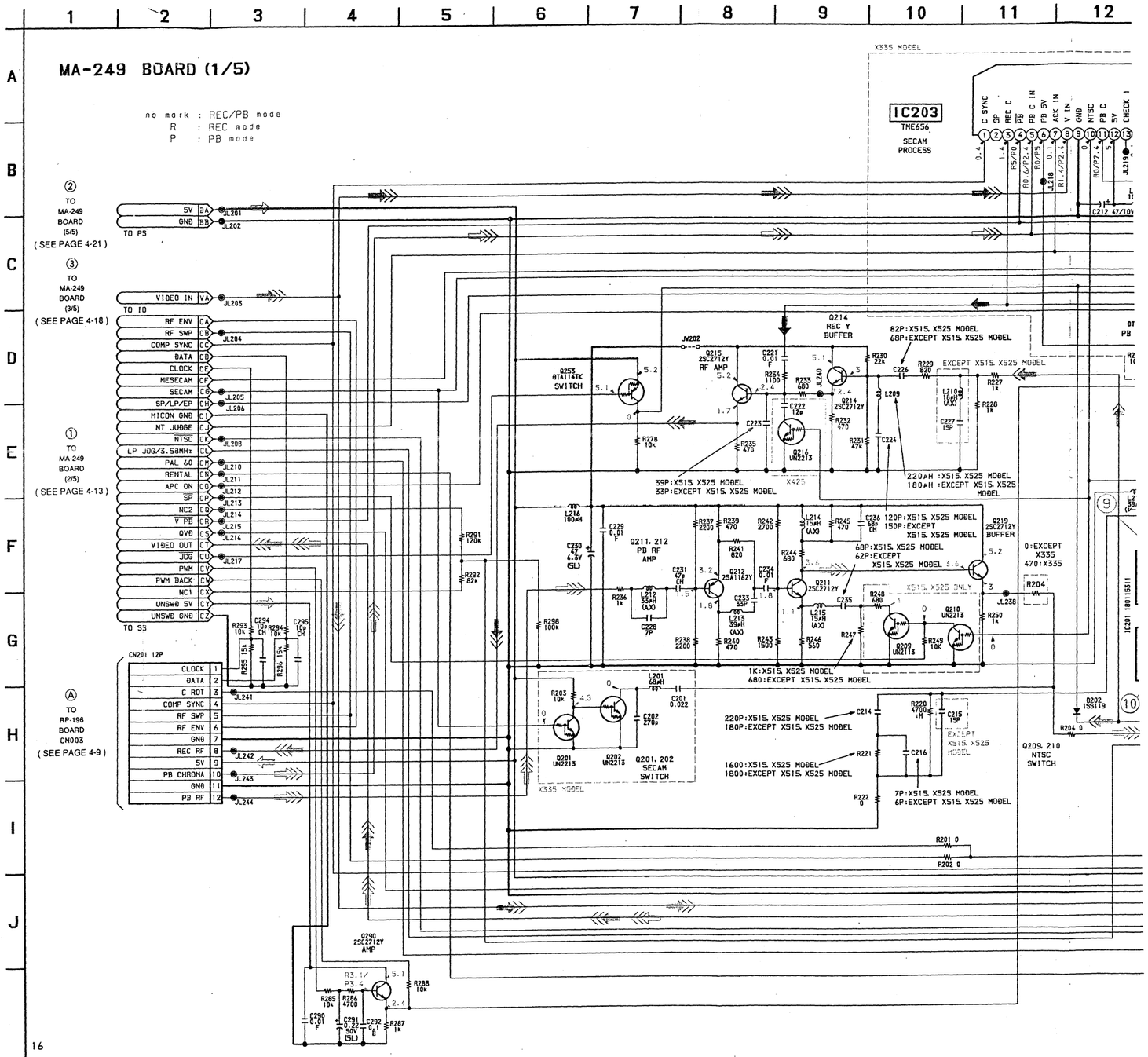


⑫ IC201 ㉖ REC/PB



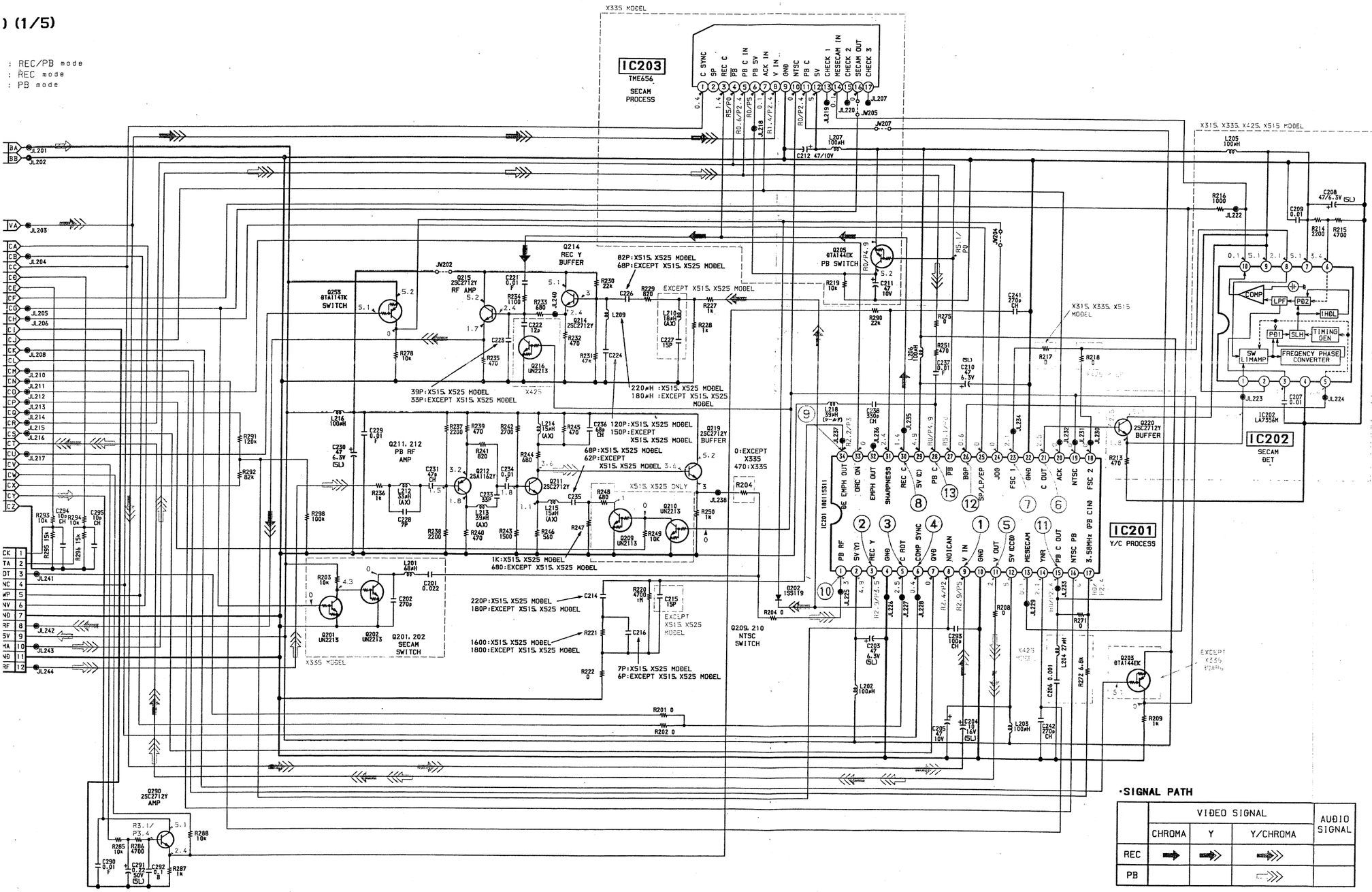
⑬ IC201 ㉘ PB





) (1/5)

: REC/PB mode
: REC mode
: PB mode

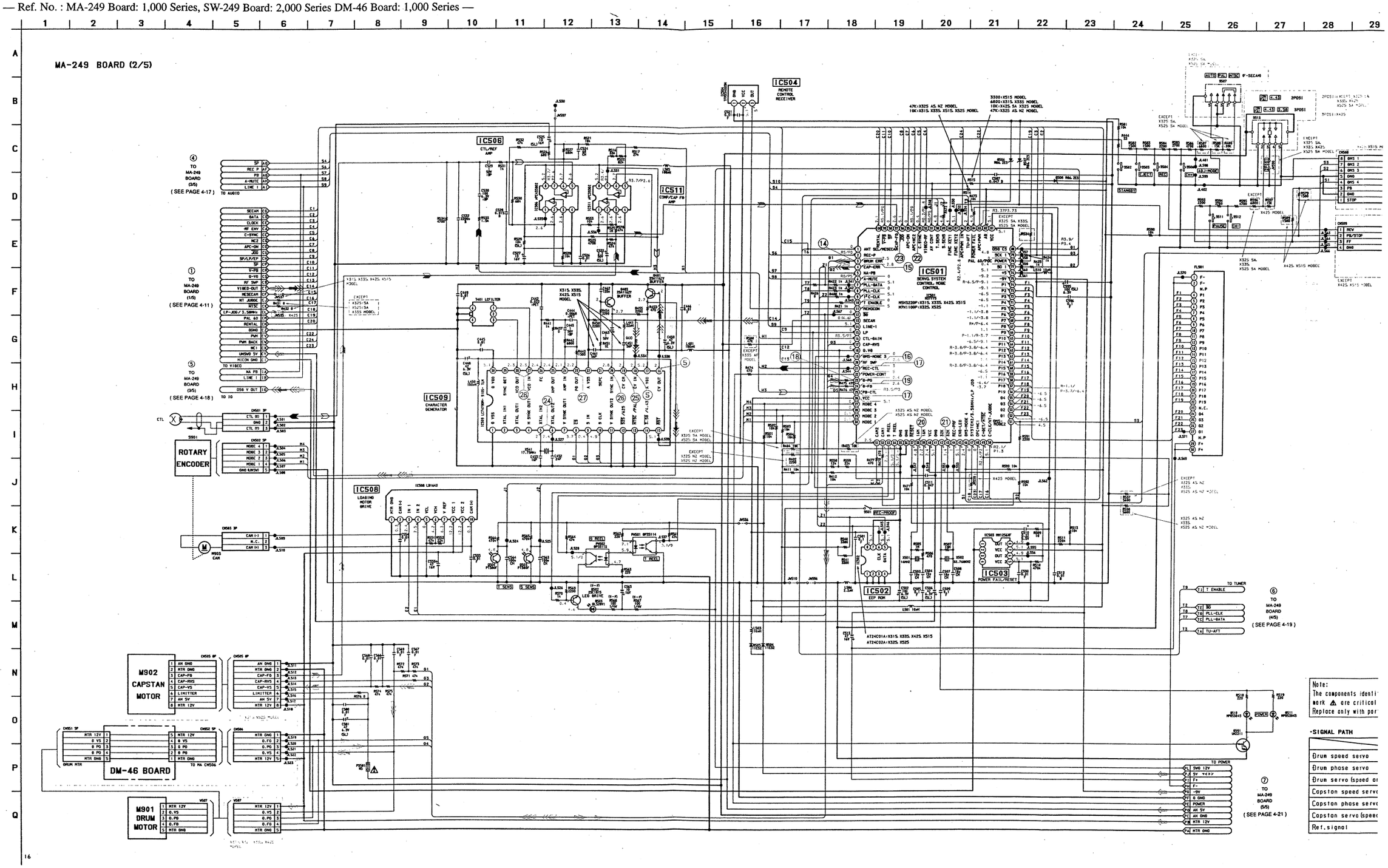


·SIGNAL PATH

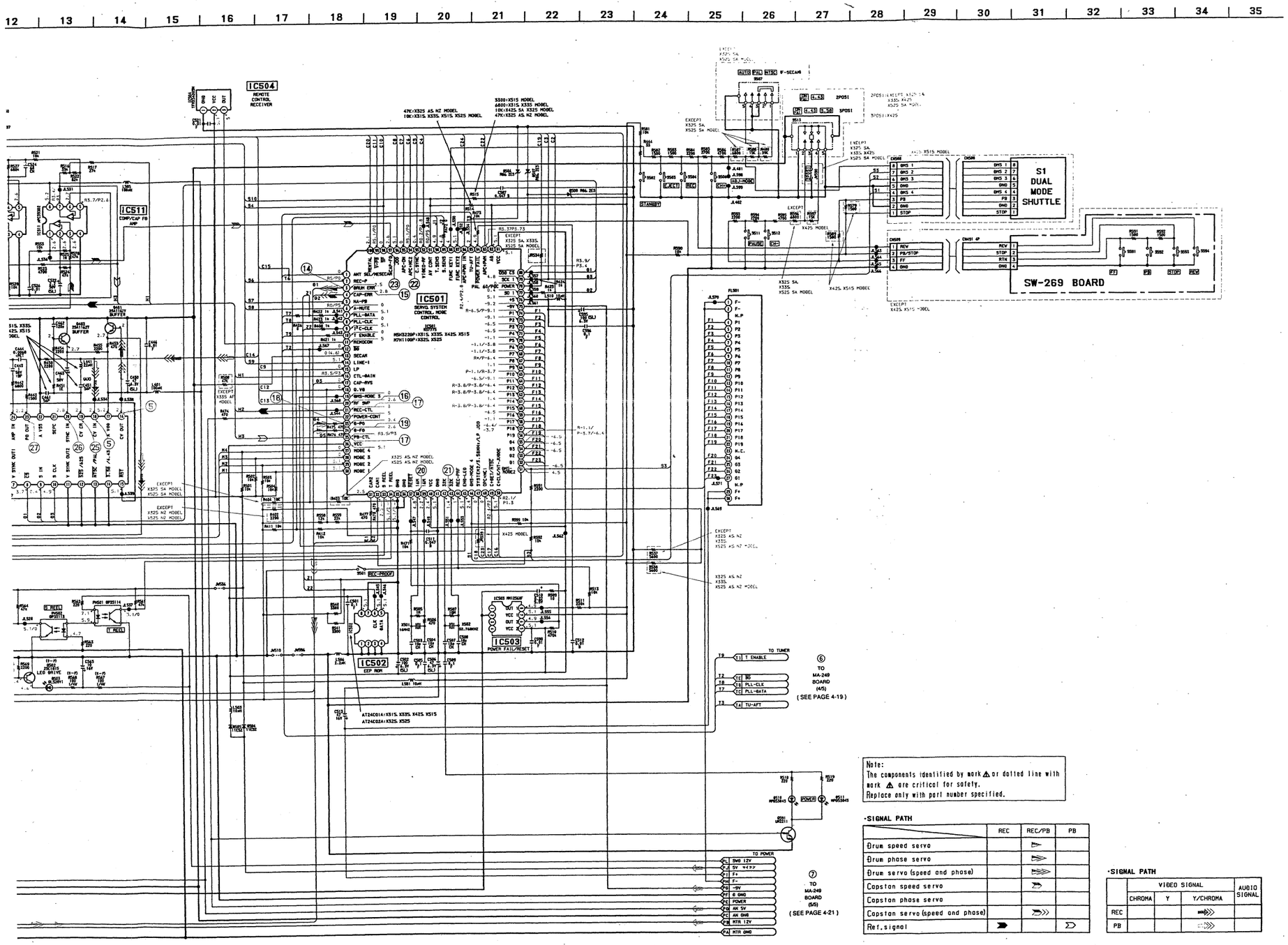
	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC	➡	➡	➡	
PB			➡	

MA-249 (SERVO, SYSTEM CONTROL), SW-269 (SWITCH), DM-46 (TRANSLATION) SCHEMATIC DIAGRAMS

— Ref. No. : MA-249 Board: 1,000 Series, SW-249 Board: 2,000 Series DM-46 Board: 1,000 Series —



S



Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

·SIGNAL PATH

	REC	REC/PB	PB
Drum speed servo		▱	
Drum phase servo		▱▱	
Drum servo (speed and phase)		▱▱▱	
Capstan speed servo		▱	
Capstan phase servo			
Capstan servo (speed and phase)		▱▱▱	
Ref. signal	▰		▱

·SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			▱▱▱	
PB			▱▱▱	

MA-249 BOARD

⑭ IC501 ③ REC/PB
5Vp-p
62.506kHz

⑮ IC501 ④ REC/PB
5Vp-p
62.506kHz

⑯ IC501 ⑳ REC/PB
5Vp-p
25Hz

⑰ IC501 ㉑ REC
IC501 ㉕ PB
4.8Vp-p
25Hz

⑱ IC501 ㉓ REC/PB
5Vp-p
25Hz

⑲ IC501 ㉔ REC/PB
5Vp-p
300Hz

⑳ IC501 ㊳ REC/PB
2.3Vp-p
16MHz

㉑ IC501 ㊸ REC/PB
3Vp-p
32.768kHz

㉒ IC501 ㊾ REC/PB
4Vp-p
H

㉓ IC501 ㊼ REC/PB
5Vp-p
1.515kHz

㉔ IC509 ⑤,⑥ REC/PB
17.73MHz
2.6Vp-p

㉕ IC509 ⑲ REC
2.2Vp-p
H

㉕ IC509 ⑲ PB
2.2Vp-p
H

㉖ IC509 ⑳ REC/PB
2Vp-p
H

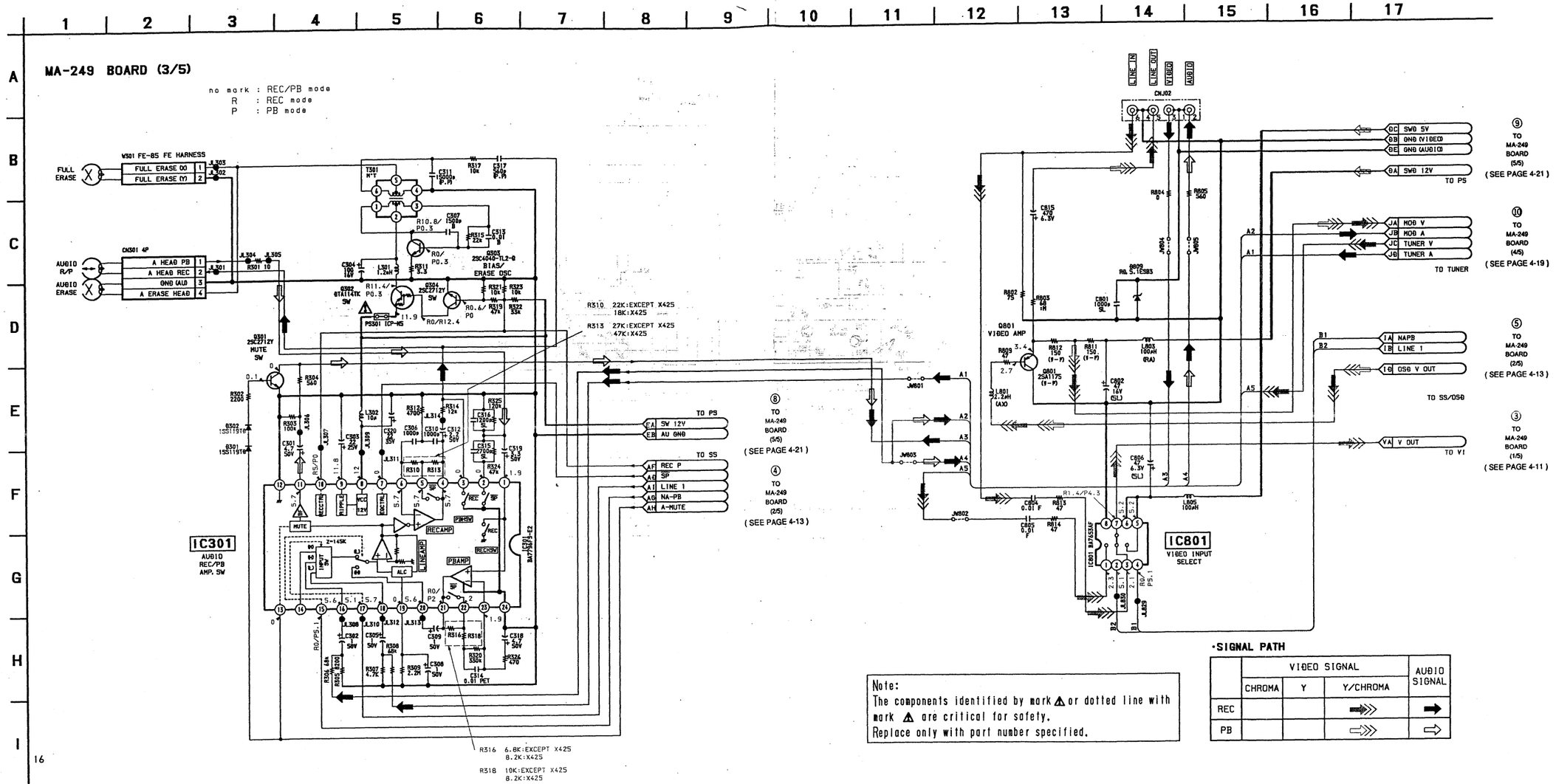
㉗ IC509 ㉓ REC/PB
4.5Vp-p
H

㉘ IC509 ㉗,㉘ REC/PB
13.7MHz
4Vp-p

MA-249 (AUDIO) SCHEMATIC DIAGRAM

• See page 4-4 to 4-6 for the printed wiring board.

— Ref. No. : MA-249 Board: 1,000 Series —



Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

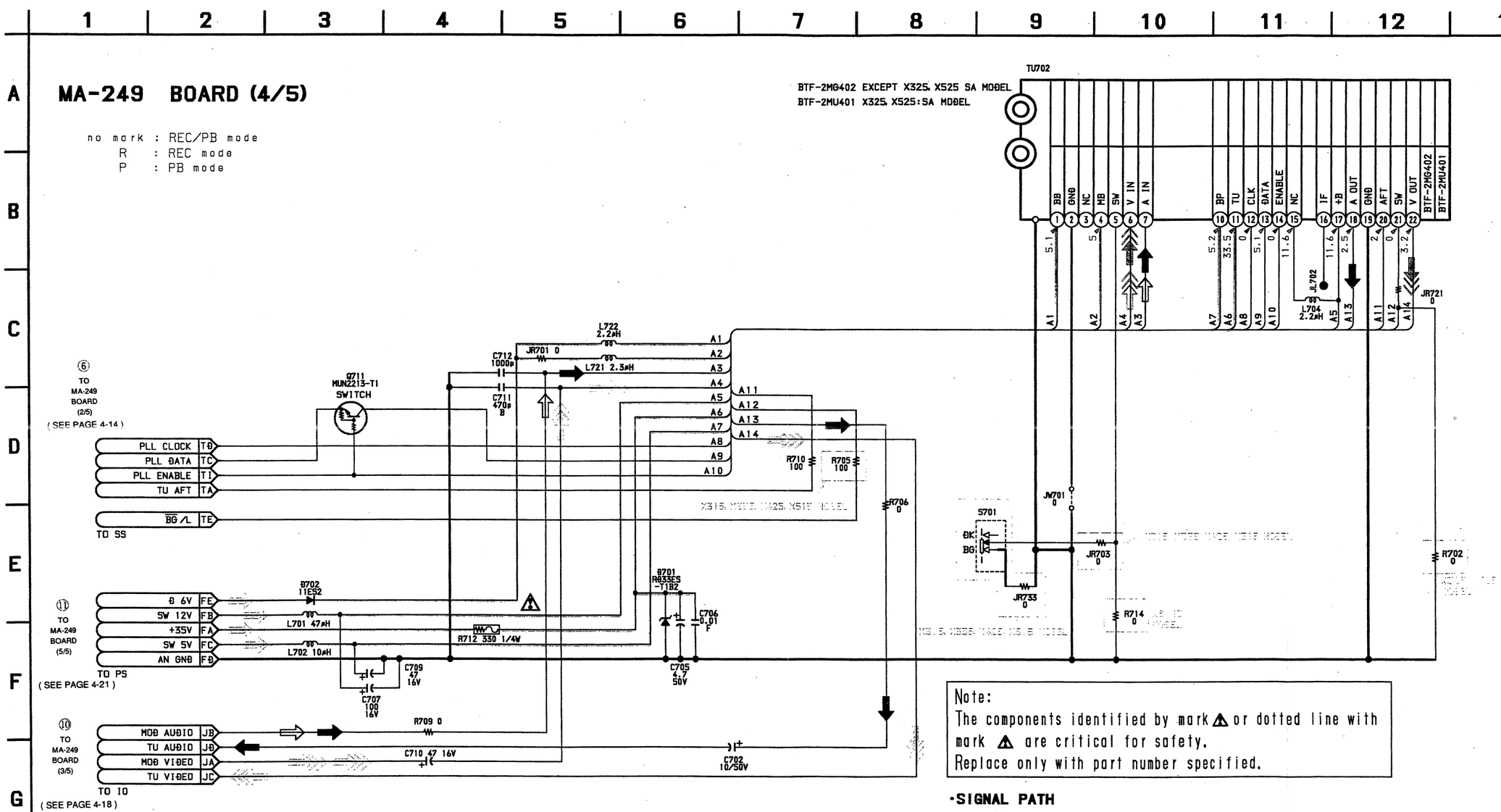
•SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			➡	➡
PB			⇨	⇨

MA-249 (TUNER) SCHEMATIC DIAGRAM

— Ref. No. : MA-249 Board: 1,000 Series —

• See page 4-4 to 4-6 for the printed wiring board.



Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

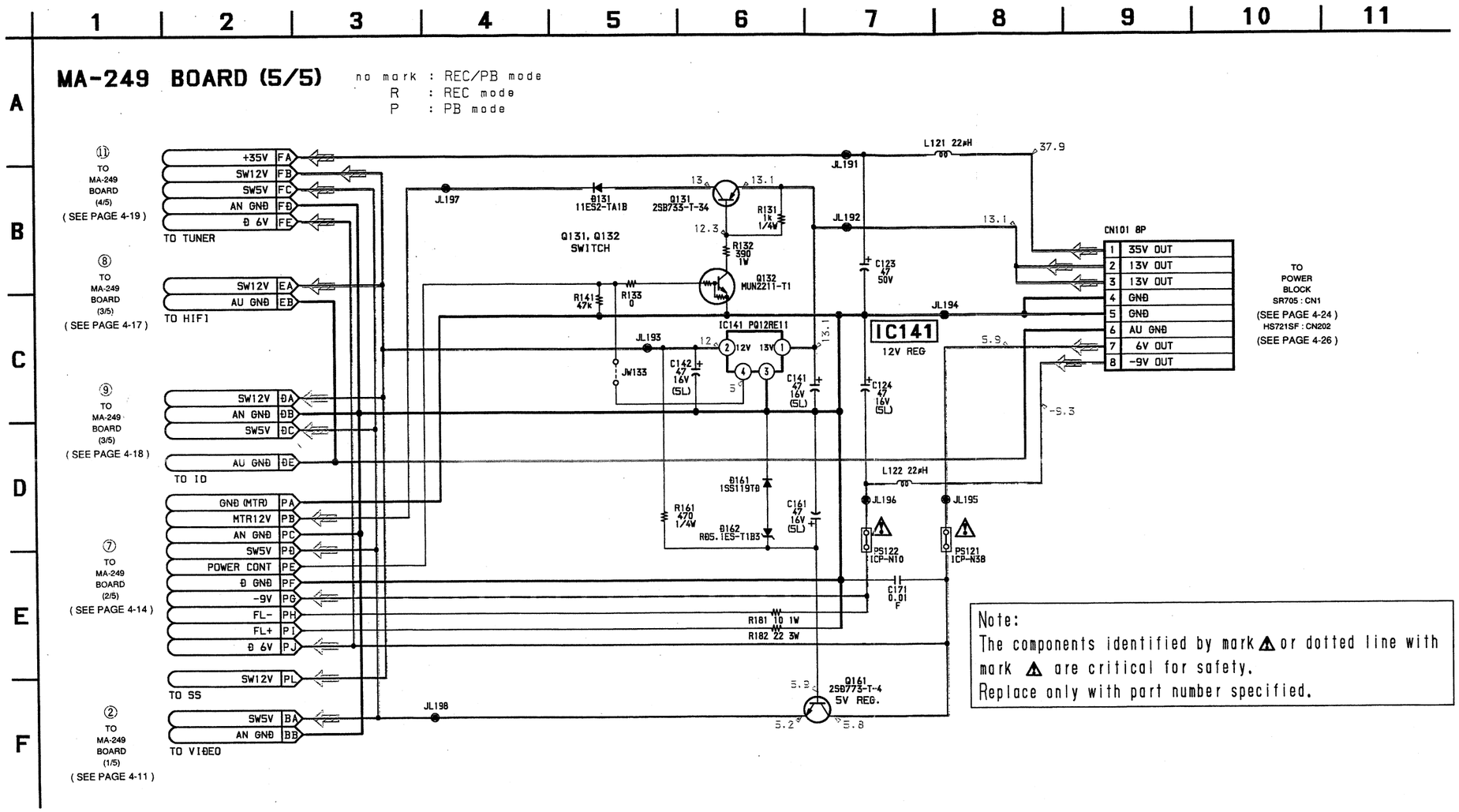
•SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC				➡
PB				⇨

MA-249 (DC POWER) SCHEMATIC DIAGRAM

• See page 4-4 to 4-6 for the printed wiring board.

— Ref. No. : MA-249 Board: 1,000 Series —

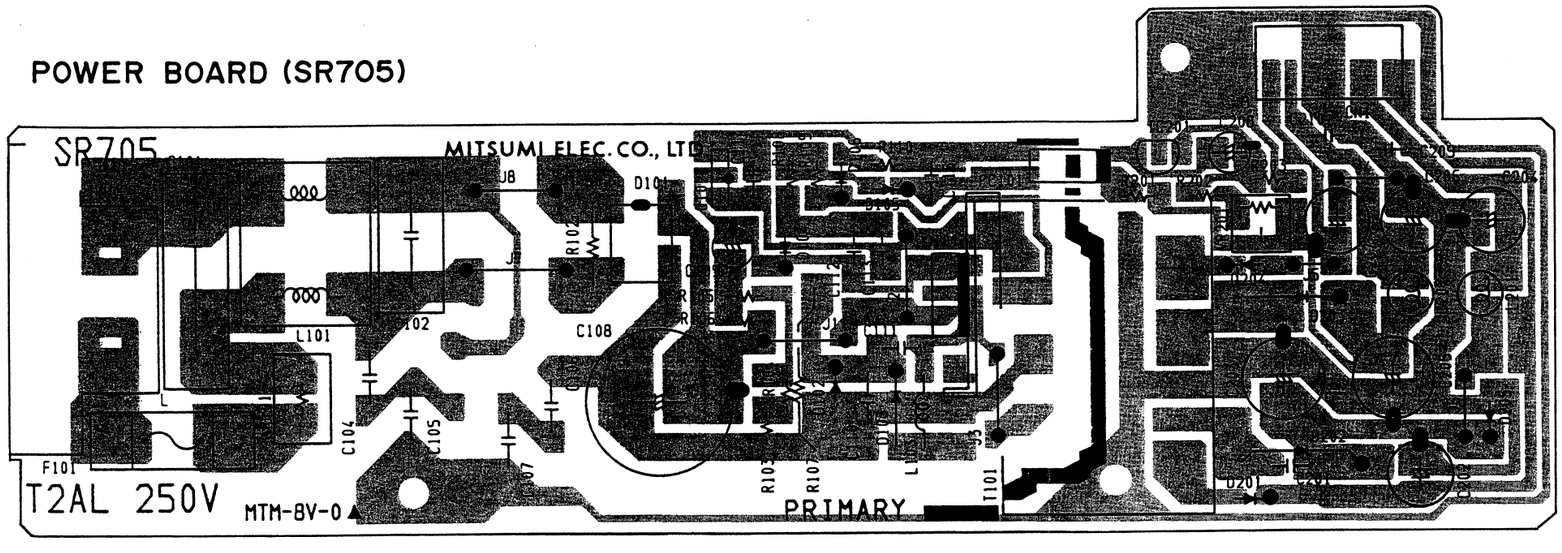


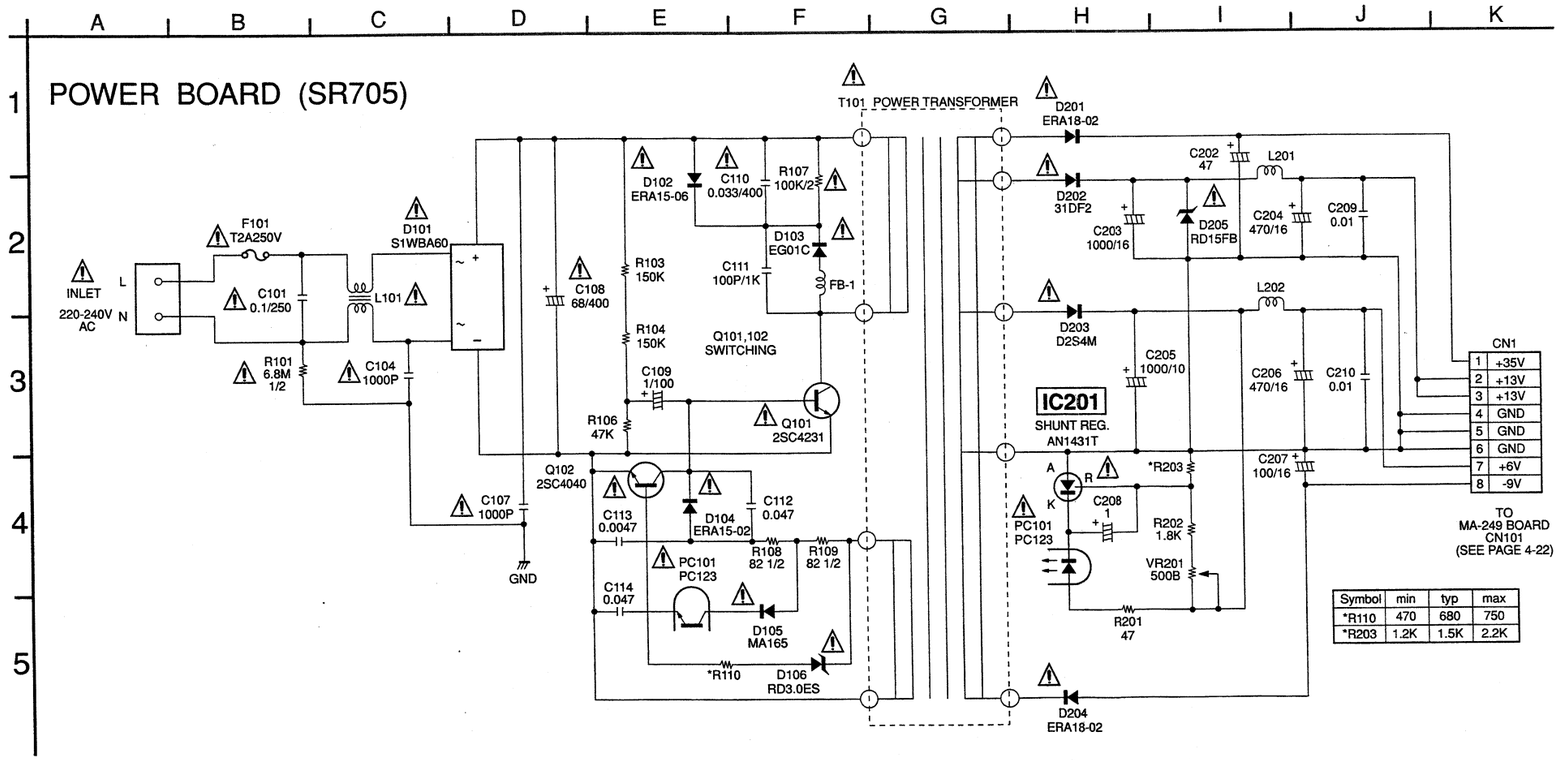
Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

POWER BLOCK (SR705) SCHEMATIC DIAGRAM AND PRINTED WIRING BOARD

— Ref. No. : Power Board: 3,000 Series —

POWER BOARD (SR705)





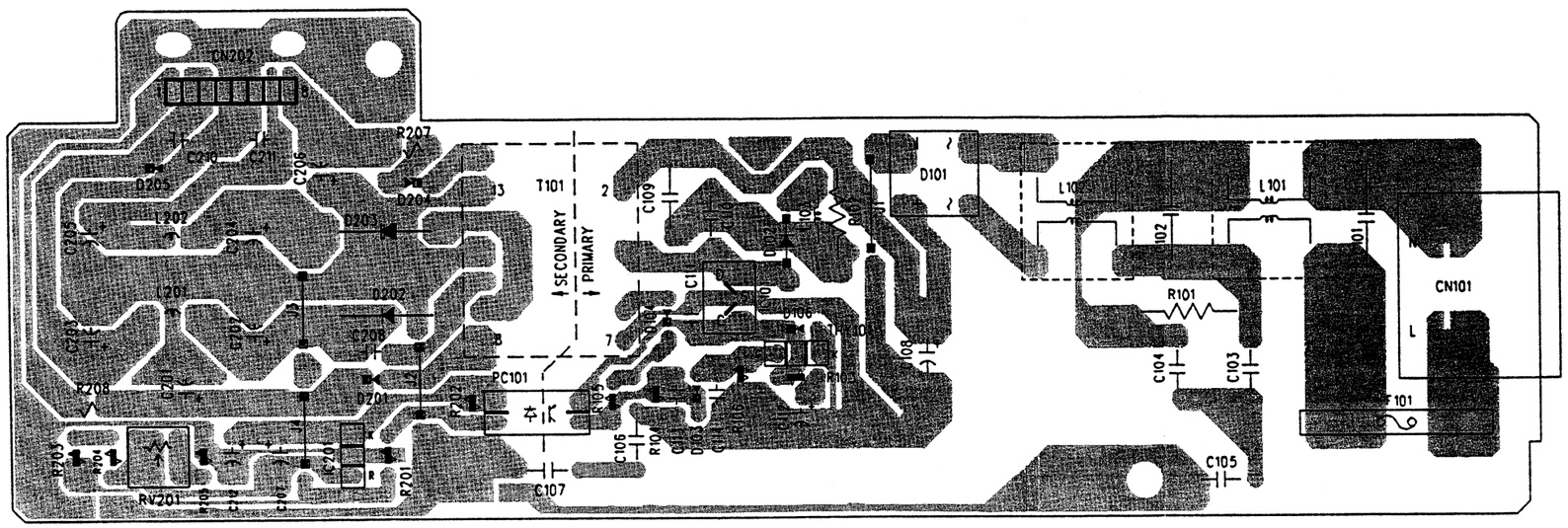
Symbol	min	typ	max
*R110	470	680	750
*R203	1.2K	1.5K	2.2K

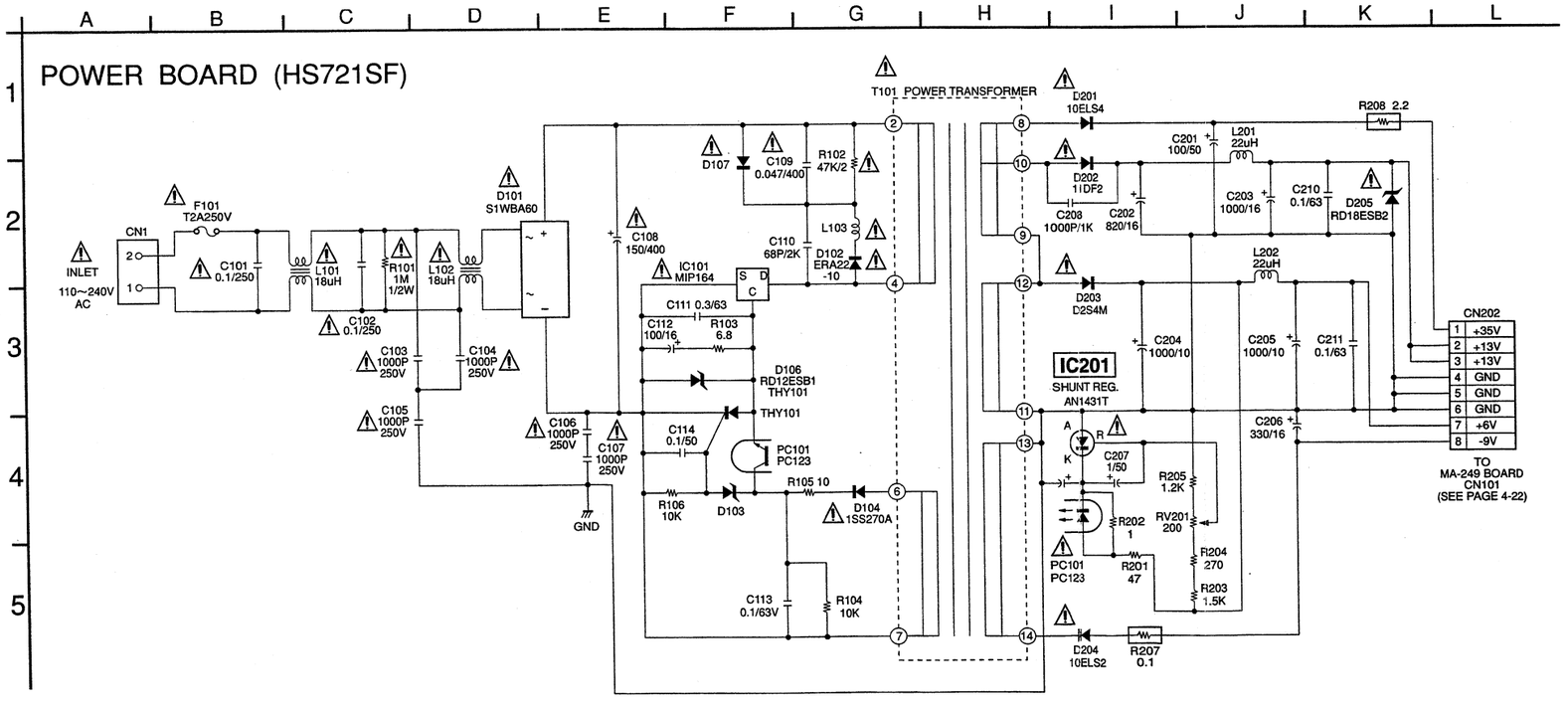
EXCEPT Australian, New Zealand Model

POWER BLOCK (HS721SF) SCHEMATIC DIAGRAM AND PRINTED WIRING BOARD

— Ref. No. : Power Board: 4,000 Series —

POWER BOARD (HS721SF)





SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/ X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA

SECTION 5

REPAIR PARTS LIST

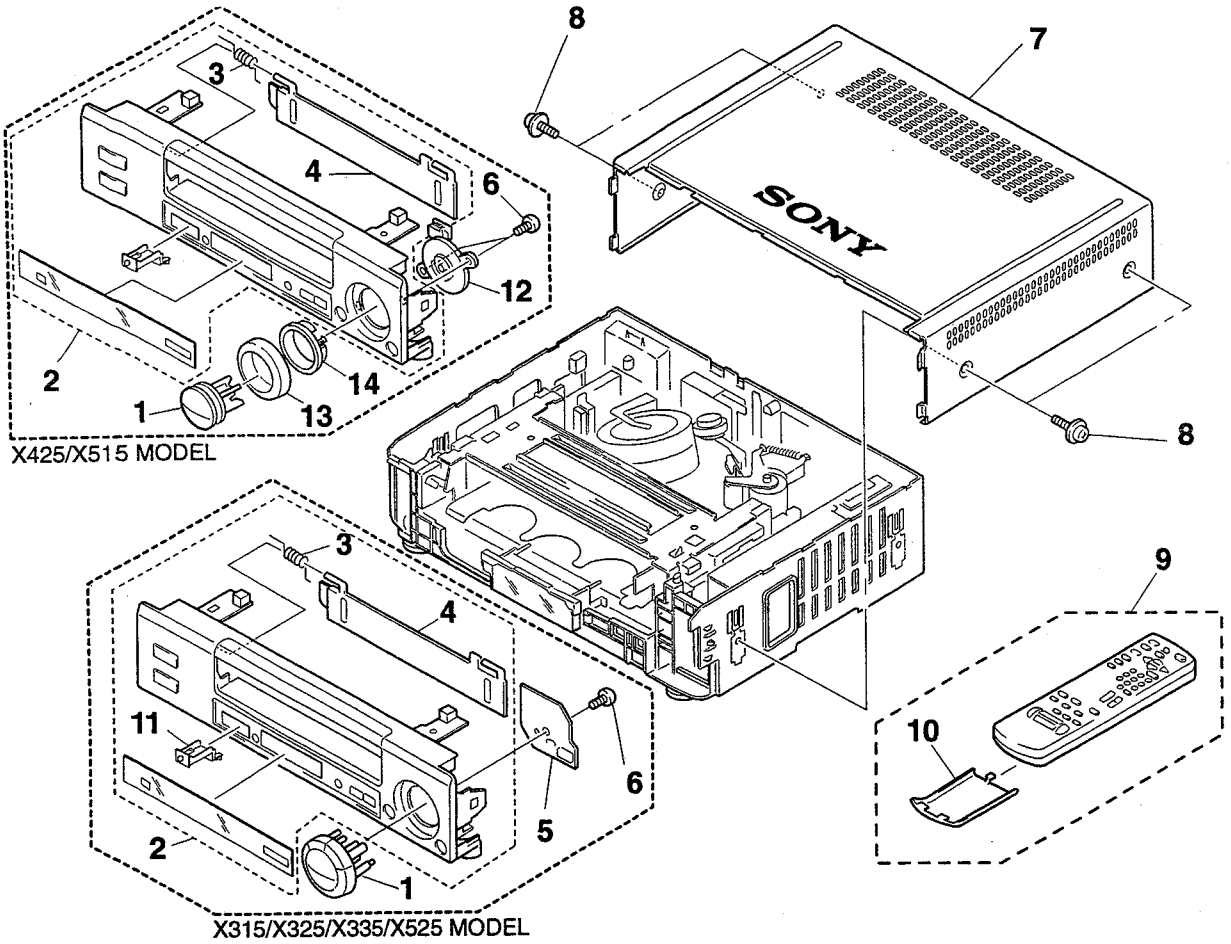
5-1. EXPLODED VIEWS

NOTE:

- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (#mark) list is given in the last of this parts list.

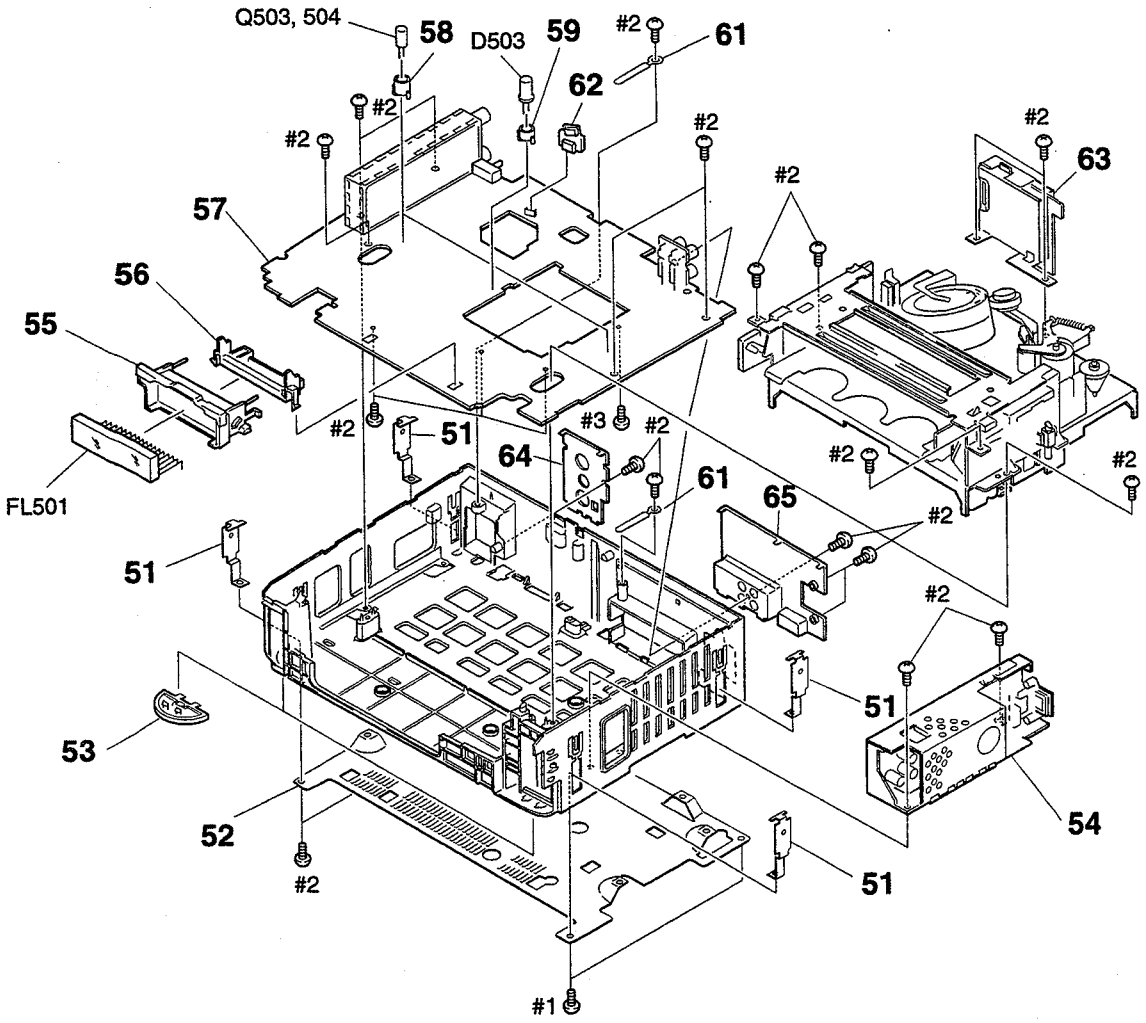
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

5-1-1. FRONT PANEL ASSY



Ref. No.	Part No.	Description	Remarks
1	X-3945-619-1	BUTTON ASSY, FUNCTION (X325:AS,NZ,X525:AS,NZ)	
1	X-3945-621-1	BUTTON ASSY, FUNCTION(X425,X515)	
1	X-3945-714-1	BUTTON ASSY, FUNCTION (X315,X325:SA,X335,X525:SA)	
2	X-3945-704-1	PANEL ASSY, FRONT(X525:AS,NZ)	
2	X-3945-705-1	PANEL ASSY, FRONT(X325:AS,NZ)	
2	X-3945-707-1	PANEL ASSY, FRONT(X515)	
2	X-3945-708-1	PANEL ASSY, FRONT(X425)	
2	X-3945-709-1	PANEL ASSY, FRONT(X315)	
2	X-3945-710-1	PANEL ASSY, FRONT(X335)	
2	X-3945-711-1	PANEL ASSY, FRONT(X525:SA)	
2	X-3945-712-1	PANEL ASSY, FRONT(X325:SA)	
3	3-953-432-01	SPRING (GE), FL	
4	3-966-858-01	DOOR, CASSETTE(X525:AS,NZ)	
4	3-966-858-21	DOOR, CASSETTE(X325:AS,NZ)	
4	3-966-858-51	DOOR, CASSETTE(X515,X525:SA)	
4	3-966-858-81	DOOR, CASSETTE(X315,X325:SA,X335,X425)	
* 5	A-6794-149-A	SW-269 BOARD, COMPLETE (X315,X325,X335,X525)	
6	4-921-277-41	SCREW (B2.6X8), TAPPING, BIND	
* 7	3-966-843-11	CASE, UPPER(X325:AS,NZ,X525:AS,NZ)	
* 7	3-966-843-41	CASE, UPPER (X315,X325:SA,X335,X425,X515,X525:SA)	
8	3-710-901-11	SCREW, TAPPING	
8	3-710-901-41	SCREW, TAPPING	
9	1-473-472-31	REMOTE COMMANDER(RMT-V181B)(X515)	
9	1-473-472-41	REMOTE COMMANDER(RMT-V181C)(X525:AS,NZ)	
9	1-473-472-51	REMOTE COMMANDER(RMT-V181D)(X525:SA)	
9	1-473-472-61	REMOTE COMMANDER(RMT-V181E) (X315,X335,X425)	
9	1-473-472-71	REMOTE COMMANDER(RMT-V181F)(X325:SA)	
9	1-473-472-81	REMOTE COMMANDER(RMT-V181G)(X325:AS,NZ)	
10	3-709-062-01	COVER, BATTERY	
11	3-966-889-01	KNOB, SLIDE (X315,X325:AS,NZ,X335, X425,X515,X525:AS,NZ)	
12	1-572-662-71	SWITCH, ROTARY (X425,X515)	
13	3-966-886-01	RING, SHUTTLE (X425 X515)	
14	3-966-890-01	RING, MODE (X425 X515)	

5-1-2. MAIN CHASSIS ASSEMBLY

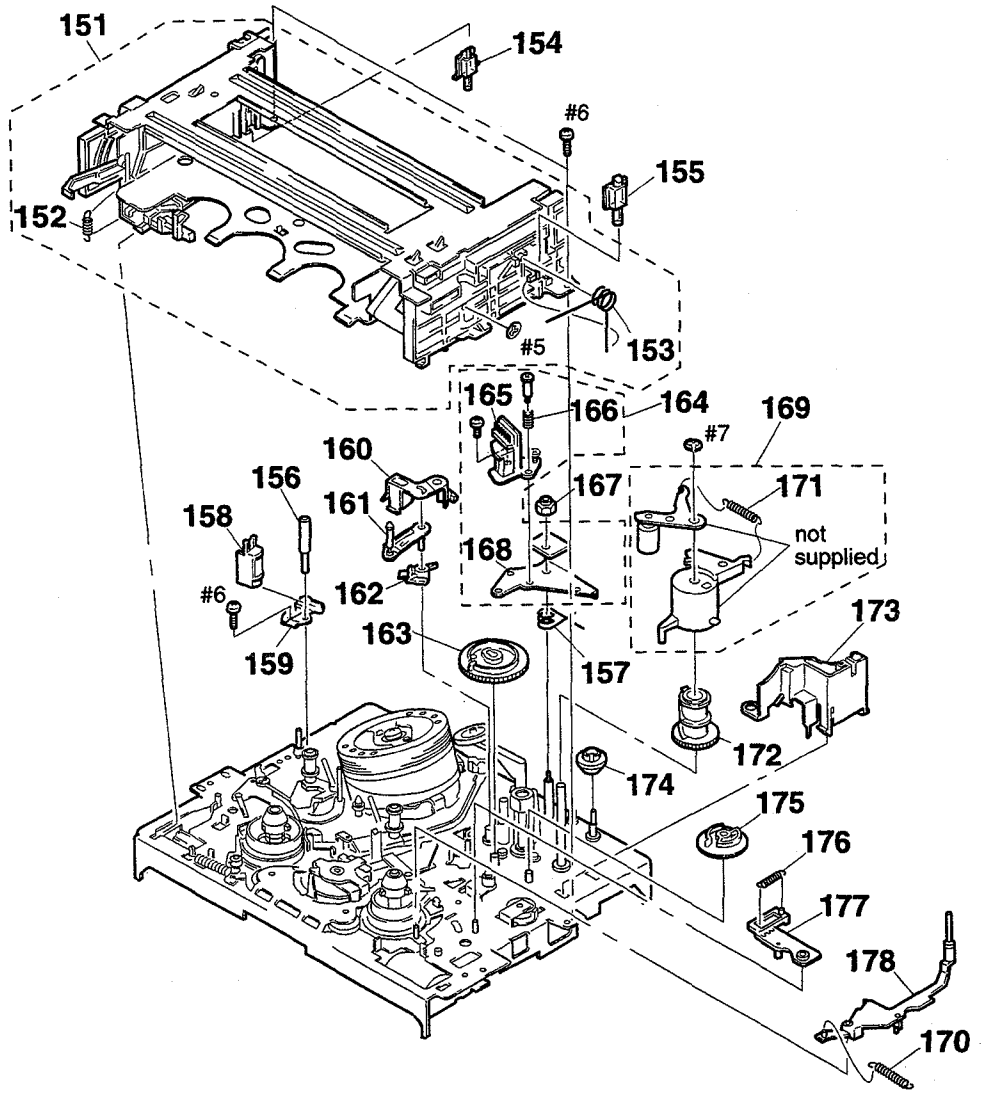


Ref. No.	Part No.	Description	Remarks
* 51	3-966-872-01	BRACKET, UPPER CASE FITTING	
* 52	3-966-839-01	PLATE, BOTTOM	
53	3-966-842-01	INSULATOR(X325:AS,NZ,X525:AS,NZ)	
53	3-966-842-11	INSULATOR (X315,X325:SA,X335,X425,X515,X525:SA)	
· ⚠54	1-468-073-11	POWER BLOCK (X315,X325:SA,X335,X425,X515,X525:SA)	
⚠54	1-468-095-11	POWER BLOCK (SR705) (X325:AS,NZ,X525:AS,NZ)	
* 55	3-966-864-01	HOLDER, INDICATION TUBE	
* 56	3-966-865-01	BASE, INDICATION TUBE	
* 57	A-6782-868-A	MA-249 BOARD, COMPLETE (X525:SA)	
* 57	A-6782-869-A	MA-249 BOARD, COMPLETE (X325:AS)	
* 57	A-6782-871-A	MA-249 BOARD, COMPLETE (X525:AS)	
* 57	A-6782-872-A	MA-249 BOARD, COMPLETE (X425)	
* 57	A-6782-873-A	MA-249 BOARD, COMPLETE (X325:SA)	
* 57	A-6782-874-A	MA-249 BOARD, COMPLETE (X335)	
* 57	A-6782-875-A	MA-249 BOARD, COMPLETE (X515)	
* 57	A-6782-877-A	MA-249 BOARD, COMPLETE (X325:NZ)	
* 57	A-6782-879-A	MA-249 BOARD, COMPLETE (X315)	

Ref. No.	Part No.	Description	Remarks
* 57	A-6782-880-A	MA-249 BOARD, COMPLETE (X525:NZ)	
* 58	3-960-273-01	SPACER, TOP END	
* 59	3-960-274-01	SPACER, LED	
61	3-703-397-01	STOPPER, WIRING	
* 62	A-6794-147-A	DM-46 BOARD, COMPLETE (X515,X525)	
* 63	A-6782-876-A	RP-196 BOARD, COMPLETE (X515,X525)	
* 63	A-6782-878-A	RP-196 BOARD, COMPLETE (X315,X325,X335,X425)	
* 64	3-966-837-41	PLATE,JACK(L),REAR(X315,X335,X425,X515)	
* 64	3-966-837-51	PLATE,JACK(L),REAR(X325,X525)	
* 65	3-966-838-51	PLATE,JACK(R),REAR(X425)	
* 65	3-966-838-61	PLATE,JACK(R),REAR (X315,X325:AS,NZ,X515,X525:AS,NZ)	
* 65	3-966-838-91	PLATE,JACK(R),REAR (X325:SA,X335,X525:SA)	
D503	8-719-048-26	DIODE GL528V1	
FL501	1-517-466-11	TUBE, FLUORESCENT INDICATOR	
Q503	8-729-025-92	PHOTO TRANSISTOR PT380F	
Q504	8-729-025-92	PHOTO TRANSISTOR PT380F	

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
· Replace only with part number specified.

5-1-3. VHS MECHANISM DECK ASSEMBLY-1



Ref. No.	Part No.	Description	Remarks
151	A-6751-496-C	FL BLOCK ASSY	
152	3-958-467-01	SPRING, TENSION COIL	
153	3-958-195-01	SPRING, TORSION	
154	3-960-215-01	PLATE, LIGHT GUIDE, END SENSOR	
155	3-960-216-01	PLATE, LIGHT GUIDE, TOP SENSOR	
156	X-3944-460-1	ROLLER ASSY, TG2	
157	3-958-487-01	SPRING, (AEC) TORSION COIL	
158	1-500-144-11	HEAD, FE	
159	X-3945-348-1	FEH ASSY	
160	3-962-298-01	BRACKET, TG7 TAPE	
161	X-3944-797-1	TG8 ASSY	
162	3-958-421-01	HOLDER, TG8	
163	3-958-152-01	GEAR, TG8	
164	A-6736-103-A	ACE BLOCK ASSY	

Ref. No.	Part No.	Description	Remarks
165	1-506-485-11	PIN, CONNECTOR 6P	
166	3-960-439-02	SPRING (ACE), COMPRESSION	
167	3-942-867-01	NUT, AC HEIGHT ADJUSTMENT	
168	3-958-491-01	BASE, ACE	
169	A-6746-072-A	PRESS BLOCK ASSY, PINCH	
170	3-958-505-01	SPRING (SOFT BRAKE T), TENSION	
171	3-958-455-01	SPRING (PINCH), TENSION	
172	3-958-151-01	GEAR, ELEVATOR	
173	3-958-454-01	OPNER, LID	
174	3-958-501-01	SCREW, ACE ADJUSTMENT	
175	3-958-153-01	GEAR, PRESS	
176	3-958-462-01	SPRING (RVS BRAKE), TENSION	
177	X-3943-885-1	ARM ASSY, RVS BRAKE	
178	X-3943-882-1	BRAKE (T) ASSY, SOFT	

5-1-4. VHS MECHANISM DECK ASSEMBLY-2

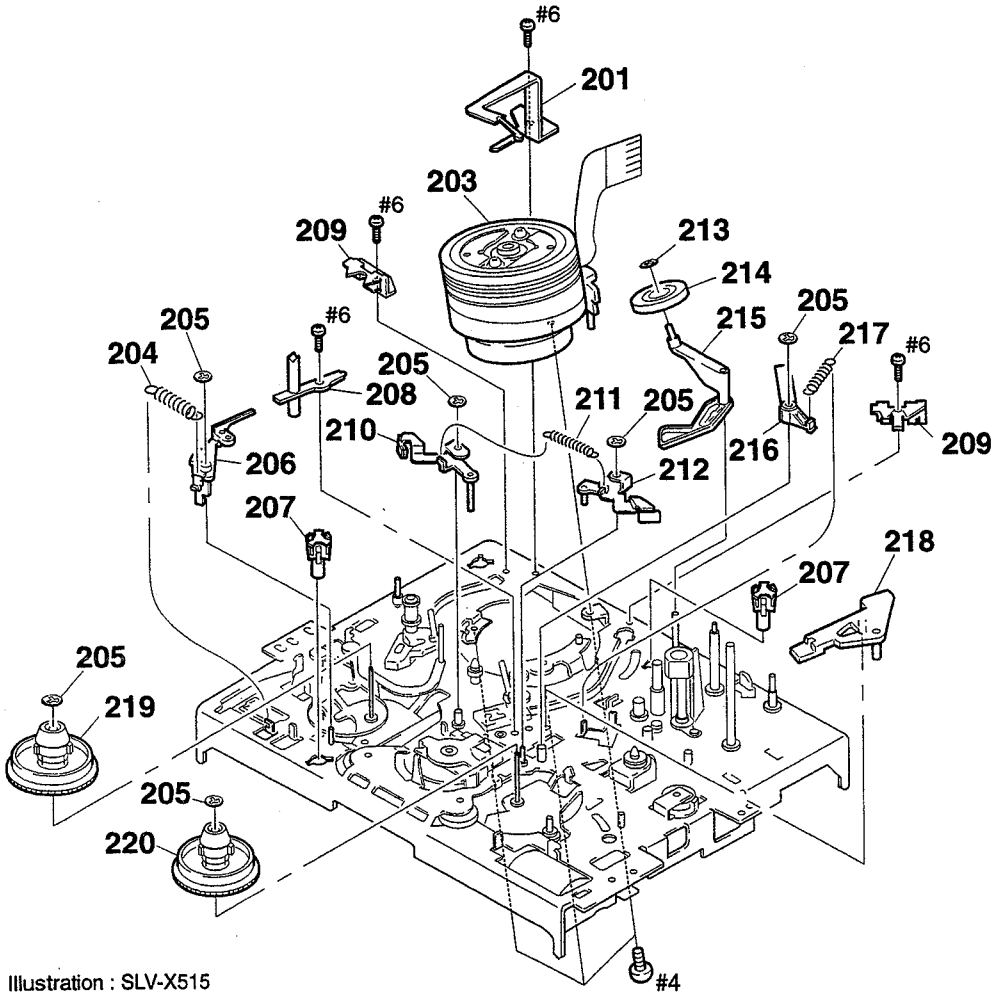
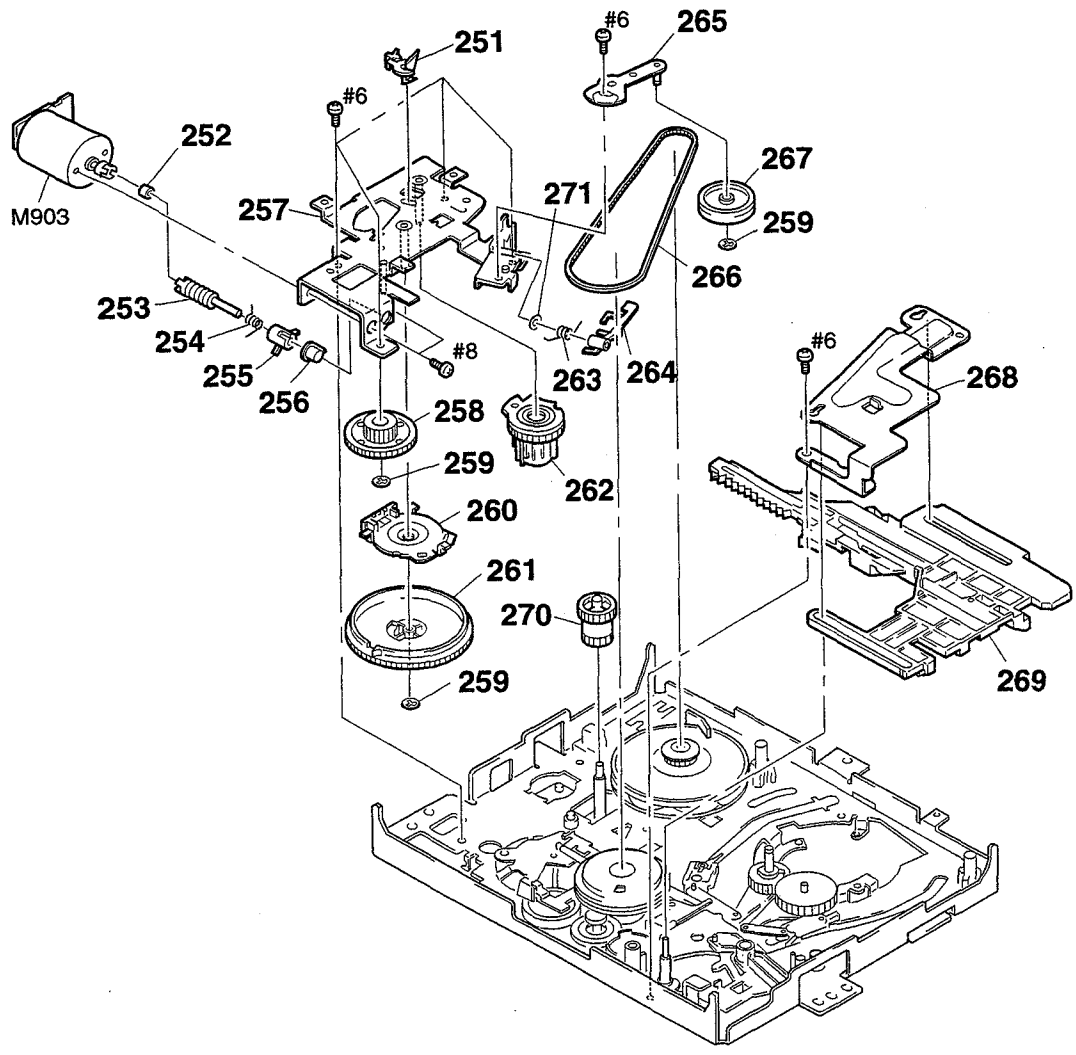


Illustration : SLV-X515

Ref. No.	Part No.	Description	Remarks
201	X-3943-899-5	GROUND ASSY, SHAFT(EXCEPT L2)	
202	2-643-205-01	SCREW	
203	1-759-183-11	DRUM ASSY DZH-78A-R (M901) (X315/X325/X335/X425)	
203	8-848-682-11	DRUM ASSY DZH-74B/Q-RP (M901)	(X515/X525)
204	3-958-443-01	SPRING, STRETCH COIL SPRING	
205	3-669-595-00	WASHER (2), STOPPER	
206	3-958-450-01	BRAKE (S), SOFT	
207	3-958-390-01	SHAFT, PC BOARD	
208	3-958-391-01	PLATE, LIGHT GUIDE, LED	
209	3-958-389-01	CATCHER	
210	X-3945-650-1	BRAKE (S) ASSY, MAIN	

Ref. No.	Part No.	Description	Remarks
211	3-958-517-01	SPRING, TENSIONCOIL	
212	X-3945-651-1	ARM (T) ASSY, MAIN BRAKE	
213	3-321-393-01	WASHER, STOPPER	
214	X-3944-363-1	ROLLER ASSY, HC	
215	X-3943-896-1	ARM ASSY, HC	
216	3-960-139-01	ARM, NEUTRALITY	
217	3-958-535-01	SPRING, TENSION	
218	3-960-138-01	ARM, PENDULUM COMPULSION	
219	X-3943-902-1	TABLE, REEL (S) ASSY	
220	X-3943-903-1	TABLE, REEL (T) ASSY	
223	3-961-441-01	SCREW (3X8)	

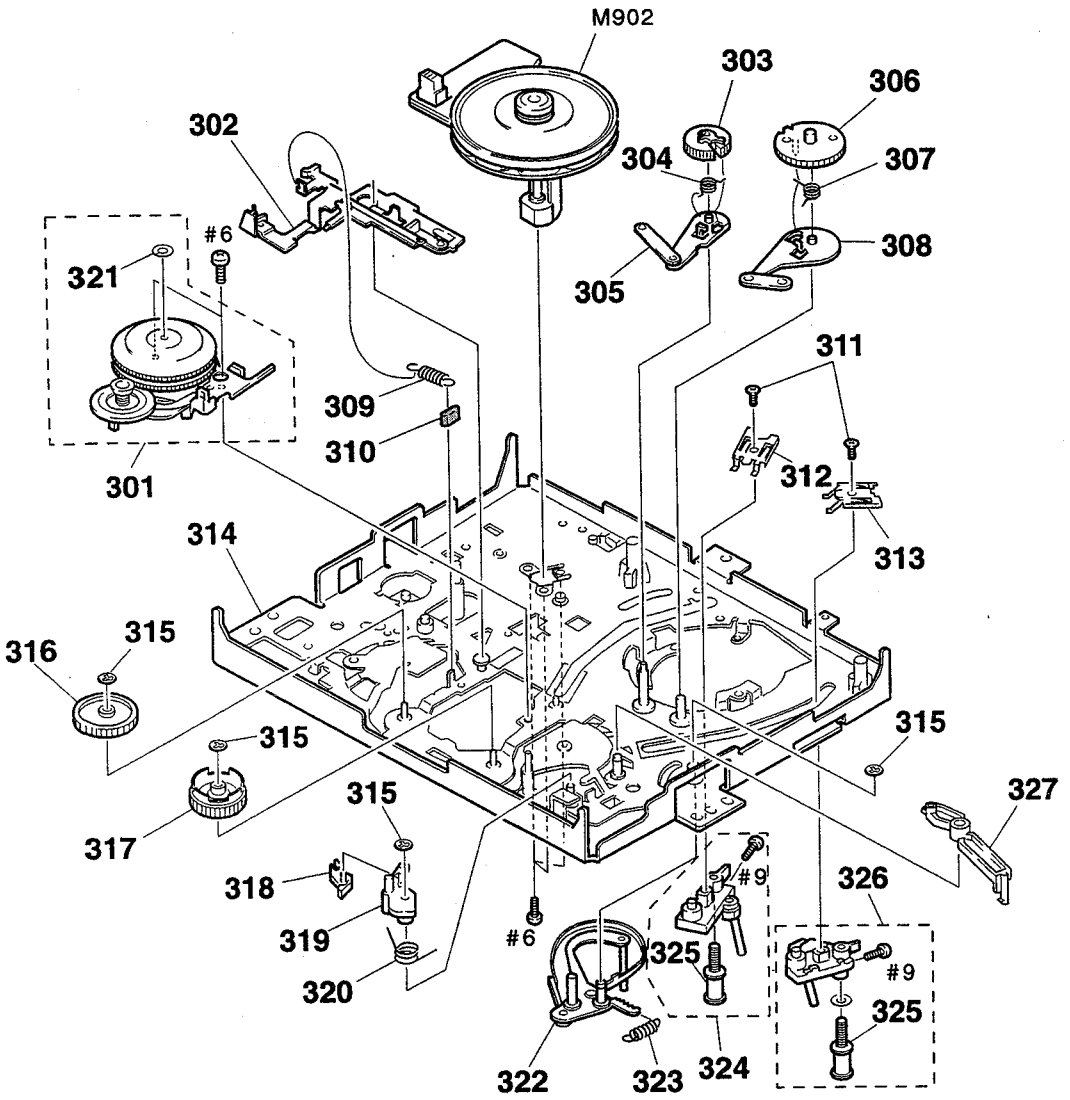
5-1-5. VHS MECHANISM DECK ASSEMBLY-3



Ref. No.	Part No.	Description	Remarks
251	3-965-977-01	RETAINER, CAM GEAR	
252	3-959-840-11	RUBBER, JOINT	
253	3-958-159-01	WORM	
254	3-958-460-01	SPRING, ONE-WAY	
255	3-958-160-01	PROPELLOR	
256	3-958-155-01	BEARING, CAM MOTOR	
* 257	X-3943-884-1	CHASSIS ASSY, CAM MOTOR	
258	3-958-157-01	WHEEL, WORM	
259	3-669-595-00	WASHER (2), STOPPER	
260	1-762-076-11	SWITCH, ROTARY	
261	3-958-161-04	GEAR, CAM	
262	3-958-156-02	GEAR, FL DRIVING	

Ref. No.	Part No.	Description	Remarks
263	3-958-445-01	SPRING,TORSIONCOIL(CAP BRAKE)	
264	X-3943-888-1	BRAKE ASSY, CAP	
265	X-3943-889-1	ARM ASSY, TENSION VEHICLE	
266	3-958-361-01	BELT, TIMING	
267	3-958-448-01	WHEEL, TENSION	
* 268	3-959-763-01	RETAINER	
269	3-958-163-04	SLIDER, MAIN	
270	3-958-162-01	GEAR,UPPER/LOWER COMMUNICATION	
271	3-701-439-21	WASHER	
M903	X-3943-883-1	MOTOR ASSY, CAM	

5-1-6. VHS MECHANISM DECK ASSEMBLY-4



Ref. No.	Part No.	Description	Remarks
301	A-6739-102-A	RKB BLOCK ASSY	
302	X-3943-897-1	LEVER ASSY, TRIGGER	
303	3-958-485-02	GEAR (T), LOADING	
304	3-960-449-01	SPRING (T), TORSION COIL	
305	X-3943-891-1	LEVER (T) ASSY, LOADING	
306	3-958-476-01	GEAR (S), LOADING	
307	3-960-448-01	SPRING (S), TORSION COIL	
308	X-3943-890-1	LEVER (S) ASSY, LOADING	
309	3-958-529-01	SPRING (MOMENT), TENSION	
310	3-959-840-11	RUBBER, JOINT	
311	3-960-720-01	SCREW	
312	3-960-688-01	SPRING, LEAF (T), LOADING	
313	3-960-687-01	SPRING, LEAF (S), LOADING	
314	X-3945-485-1	CHASSIS ASSY, MECHANICAL	
315	3-669-595-00	WASHER (2), STOPPER	
316	3-962-960-01	GEAR (T-K), IDLER	
317	3-962-959-01	GEAR (S-K), IDLER	

Ref. No.	Part No.	Description	Remarks
318	3-958-533-01	CLAW, S WINDING	
319	3-958-532-01	ARM, S WINDING	
320	3-958-534-01	SPRING, TORSION	
321	3-966-092-01	RING, RETAINING, SLIT WASHER	
322	X-3943-886-1	TG1 ASSY	
323	3-958-492-01	SPRING (TG1), TENSION COIL	
324	A-6750-314-A	T BLOCK ASSY, SHUTTLE	
325	X-3944-378-1	ROLLER ASSY, GUIDE	
326	A-6750-316-A	SHUTTLE (S) BLOCK ASSY	
327	3-958-504-01	ARM, FIXED RELEASE	
328	3-962-874-01	O-RING	
M902	1-698-409-14	MOTOR, DC (CAPSTAN)	

5-2. ELECTRICAL PARTS LIST

NOTE:

When indicating parts by reference number, please include the board name.

The components identified by mark ⚠ or dotted line with mark ⚠ are *critical for safety.*
Replace only with part number specified.

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- CAPACITORS:
  uF: μF
- RESISTORS
  All resistors are in ohms.
  METAL: metal-film resistor
  METAL OXIDE: Metal Oxide-film resistor
  F: nonflammable
- COILS
  uH: μH
- SEMICONDUCTORS
  In each case, u: μ, for example:
  uA...: μA... , uPA... , μPA... ,
  uPB... , μPB... , uPC... , μPC... ,
  uPD..., μPD...

Ref. No.	Part No.	Description			Remarks
*	A-6794-147-A	DM-46 BOARD, COMPLETE (X515,X525)			
		**********			
					(Ref.No.2,000 Series)
		< CONNECTOR >			
CN951	1-766-713-11	CONNECTOR, BOARD TO BOAR 5P			
* CN952	1-766-714-11	CONNECTOR, BOARD TO BOAR 5P			
*	A-6782-875-A	MA-249 BOARD, COMPLETE (X515)			
		**********			
*	A-6782-872-A	MA-249 BOARD, COMPLETE (X425)			
		**********			
*	A-6782-879-A	MA-249 BOARD, COMPLETE (X315)			
		**********			
*	A-6782-874-A	MA-249 BOARD, COMPLETE (X335)			
		**********			
*	A-6782-868-A	MA-249 BOARD, COMPLETE (X525:SA)			
		**********			
*	A-6782-873-A	MA-249 BOARD, COMPLETE (X325:SA)			
		**********			
*	A-6782-871-A	MA-249 BOARD, COMPLETE (X525:AS)			
		**********			
*	A-6782-880-A	MA-249 BOARD, COMPLETE (X525:NZ)			
		**********			
*	A-6782-869-A	MA-249 BOARD, COMPLETE (X325:AS)			
		**********			
*	A-6782-877-A	MA-249 BOARD, COMPLETE (X325:NZ)			
		**********			
					(Ref.No.1,000 Series)
*	3-960-273-01	SPACER, TOP END			
*	3-960-274-01	SPACER, LED			
*	3-966-864-01	HOLDER, INDICATION TUBE			
*	3-966-865-01	BASE, INDICATION TUBE			
		< CAPACITOR >			
C123	1-126-967-11	ELECT	47uF	20%	50V
C124	1-124-589-11	ELECT	47uF	20%	16V
C141	1-124-589-11	ELECT	47uF	20%	16V
C142	1-124-589-11	ELECT	47uF	20%	16V
C161	1-124-589-11	ELECT	47uF	20%	16V
C171	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C201	1-163-033-91	CERAMIC CHIP	0.022uF		50V
					(X335)
C202	1-163-127-00	CERAMIC CHIP	270PF	5%	50V
					(X335)
C203	1-126-154-11	ELECT	47uF	20%	6.3V
C204	1-126-157-11	ELECT	10uF	20%	16V
C205	1-126-967-11	ELECT	47uF	20%	10V
C206	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V
					(X425)
C207	1-164-232-11	CERAMIC CHIP	0.01uF		50V
					(X315,X335,X425,X515)
C208	1-126-154-11	ELECT	47uF	20%	6.3V
					(X315,X335,X425,X515)
C209	1-163-031-11	CERAMIC CHIP	0.01uF		50V
					(X315,X335,X425,X515)
C210	1-126-154-11	ELECT	47uF	20%	6.3V

Ref. No.	Part No.	Description			Remarks
C211	1-126-967-11	ELECT	47uF	20%	10V
					(X335)
C212	1-126-967-11	ELECT	47uF	20%	10V
					(X335)
C214	1-163-124-00	CERAMIC CHIP	200PF	5%	50V
					(X515,X525)
C214	1-163-257-11	CERAMIC CHIP	180PF	5%	50V
					(X315,X325,X335,X425)
C215	1-163-231-11	CERAMIC CHIP	15PF	5%	50V
					(X315,X325,X335,X425)
C216	1-163-224-11	CERAMIC CHIP	7PF	0.25PF	50V
					(X515,X525)
C216	1-163-089-00	CERAMIC CHIP	6PF		50V
					(X315,X325,X335,X425)
C221	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C222	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
					(X425)
C223	1-163-241-11	CERAMIC CHIP	39PF	5%	50V
					(X515,X525)
C223	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
					(X315,X325,X335,X425)
C224	1-163-253-11	CERAMIC CHIP	120PF	5%	50V
					(X515,X525)
C224	1-163-121-00	CERAMIC CHIP	150PF	5%	50V
					(X315,X325,X335,X425)
C226	1-163-249-11	CERAMIC CHIP	82PF	5%	50V
					(X515,X525)
C226	1-163-113-00	CERAMIC CHIP	68PF	5%	50V
					(X315,X325,X335,X425)
C227	1-163-231-11	CERAMIC CHIP	15PF	5%	50V
					(X315,X325,X335,X425)
C228	1-163-224-11	CERAMIC CHIP	7PF	0.25PF	50V
C229	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C230	1-126-154-11	ELECT	47uF	20%	6.3V
C231	1-163-243-11	CERAMIC CHIP	47PF	5%	50V
C233	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
C234	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C235	1-163-113-00	CERAMIC CHIP	68PF	5%	50V
					(X515,X525)
C235	1-163-112-00	CERAMIC CHIP	62PF	5%	50V
					(X315,X325,X335,X425)
C236	1-163-113-00	CERAMIC CHIP	68PF	5%	50V
C237	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C238	1-163-263-11	CERAMIC CHIP	330PF	5%	50V
C241	1-163-127-00	CERAMIC CHIP	270PF	5%	50V
C242	1-163-127-00	CERAMIC CHIP	270PF	5%	50V
C290	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C291	1-124-464-11	ELECT	0.22uF	20%	50V
C292	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C293	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C294	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C295	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C301	1-126-963-11	ELECT	4.7uF	20%	50V
C302	1-126-160-11	ELECT	1uF	20%	50V
C303	1-128-551-11	ELECT	22uF	20%	25V
C304	1-126-933-11	ELECT	100uF	20%	16V

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Ref. No.	Part No.	Description			Remarks
C305	1-126-160-11	ELECT	1uF	20%	50V
C306	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V
C307	1-163-011-11	CERAMIC CHIP	0.0015uF	10%	50V
C308	1-126-160-11	ELECT	1uF	20%	50V
C309	1-126-160-11	ELECT	1uF	20%	50V
C310	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V
C311	1-104-696-11	FILM	0.015uF	5%	100V
C312	1-124-257-00	ELECT	2.2uF	20%	50V
C313	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C314	1-137-370-11	FILM	0.01uF	5%	50V
C315	1-163-014-00	CERAMIC CHIP	0.0027uF	5%	50V
C316	1-163-143-00	CERAMIC CHIP	0.0012uF	5%	50V
C317	1-137-431-11	FILM	560PF	5%	50V
C318	1-126-163-11	ELECT	4.7uF	20%	50V
C319	1-126-162-11	ELECT	3.3uF	20%	50V
C320	1-124-248-00	ELECT	22uF	20%	35V
C442	1-130-487-00	MYLAR	0.022uF	5%	50V
C443	1-124-499-11	ELECT, NONPOLAR	1uF	20%	50V
C444	1-130-481-00	MYLAR	0.0068uF	5%	50V
C445	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C446	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C448	1-126-154-11	ELECT	47uF	20%	6.3V
C449	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C450	1-126-154-11	ELECT	47uF	20%	6.3V
C451	1-163-245-11	CERAMIC CHIP	56PF	5%	50V (X315,X335,X425,X515)
C452	1-163-102-00	CERAMIC CHIP	24PF	5%	50V
C453	1-163-098-00	CERAMIC CHIP	16PF	5%	50V
C461	1-163-245-11	CERAMIC CHIP	56PF	5%	50V (X315,X335,X425,X515)
C462	1-163-253-11	CERAMIC CHIP	120PF	5%	50V
C463	1-126-160-11	ELECT	1uF	20%	50V
C501	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C502	1-124-584-00	ELECT	100uF	20%	10V
C503	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C504	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C505	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C506	1-126-154-11	ELECT	47uF	20%	6.3V
C507	1-163-099-00	CERAMIC CHIP	18PF	5%	50V
C508	1-163-099-00	CERAMIC CHIP	18PF	5%	50V
C509	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C510	1-104-905-11	CAPACITOR	0.22F		5.5V
C511	1-104-760-11	CERAMIC CHIP	0.047uF	10%	50V
C512	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C513	1-124-589-11	ELECT	47uF	20%	16V
C521	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C522	1-124-257-00	ELECT	2.2uF	20%	50V
C524	1-163-113-00	CERAMIC CHIP	68PF	5%	50V
C525	1-126-157-11	ELECT	10uF	20%	16V
C526	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C527	1-126-157-11	ELECT	10uF	20%	16V
C528	1-163-023-00	CERAMIC CHIP	0.015uF	5%	50V
C529	1-124-499-11	ELECT, NONPOLAR	1uF	20%	50V
C530	1-126-235-11	ELECT	100uF	20%	6.3V
C532	1-164-161-11	CERAMIC CHIP	0.0022uF	10%	100V
C553	1-124-589-11	ELECT	47uF	20%	16V
C554	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C555	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C563	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C564	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C565	1-126-157-11	ELECT	10uF	20%	16V
C566	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C567	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C568	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C569	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C580	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C581	1-126-154-11	ELECT	47uF	20%	6.3V
C587	1-104-760-11	CERAMIC CHIP	0.047uF	10%	50V
C590	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C595	1-124-584-00	ELECT	100uF	20%	10V

Ref. No.	Part No.	Description			Remarks
C596	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C702	1-126-964-11	ELECT	10uF	20%	50V
C705	1-126-963-11	ELECT	4.7uF	20%	50V
C706	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C707	1-126-933-11	ELECT	100uF	20%	16V
C709	1-126-967-11	ELECT	47uF	20%	16V
C710	1-126-967-11	ELECT	47uF	20%	16V
C711	1-163-005-11	CERAMIC CHIP	470PF	10%	50V
C712	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V
C801	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V
C802	1-124-589-11	ELECT	47uF	20%	16V
C804	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C805	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C806	1-126-154-11	ELECT	47uF	20%	6.3V
C815	1-126-935-11	ELECT	470uF	20%	6.3V

< CONNECTOR >

CN101	1-569-667-11	CONNECTOR, BOARD TO BOARD 8P	
CN201	1-573-844-11	CONNECTOR, BOARD TO BOARD 12P	
* CN301	1-560-892-00	PIN, CONNECTOR 4P	
* CN501	1-560-891-00	PIN, CONNECTOR 3P	
* CN502	1-766-537-11	CONNECTOR (HMD) 5P	
* CN503	1-766-716-11	CONNECTOR, BOARD TO BOARD 3P	
* CN505	1-766-538-11	CONNECTOR, BOARD TO BOARD 8P	
* CN506	1-766-717-11	CONNECTOR, BOARD TO BOARD 5P(X515,X525)	
CN508	1-506-473-11	PIN, CONNECTOR 8P(X425,X515)	
CN509	1-506-469-11	PIN, CONNECTOR 4P(X315,X325,X335,X525)	

< JACK >

CNJ02	1-774-805-11	JACK, PIN 4P (AUDIO/VIDEO)	

< DIODE >

⚠D131	8-719-200-82	DIODE	11ES2
D161	8-719-911-19	DIODE	1SS119
D162	8-719-109-86	DIODE	RD5.1ES-B3
D202	8-719-911-19	DIODE	1SS119
D301	8-719-911-19	DIODE	1SS119
D302	8-719-911-19	DIODE	1SS119
D503	8-719-048-26	DIODE	GL528V1
⚠D504	8-719-200-82	DIODE	11ES2
⚠D505	8-719-200-82	DIODE	11ES2
D506	8-719-109-93	DIODE	RD6.2ES-B2
D507	8-719-109-93	DIODE	RD6.2ES-B2
D508	8-719-109-93	DIODE	RD6.2ES-B2
D510	8-719-050-12	DIODE	MPG5304S(STANDBY)
D511	8-719-050-12	DIODE	MPG5304S(STANDBY)
D701	8-719-110-78	DIODE	RD33ES-B2
D702	8-719-200-82	DIODE	11ES2
D809	8-719-109-86	DIODE	RD5.1ES-B3

< FILTER >

FL501	1-517-466-11	TUBE, FLUORESCENT INDICATOR

< TERMINAL >

GB101	1-537-770-21	TERMINAL BOARD, GROUND

< IC >

⚠IC141	8-759-189-48	IC	PQ12RE11
IC201	1-801-153-11	IC	YC MODULE, 3 (PAL)(EXCEPT X425)
IC201	1-801-168-11	IC	YC MODULE 3 (MULTI)(X425)
IC202	1-810-636-11	IC	LA7356M-TLM (X315,X335,X425,X515)
IC203	1-809-959-12	IC	TME656 (X335)
IC301	8-759-268-02	IC	BA7796FS-E2
IC501	8-759-391-36	IC	M37775M5H322GP(X315,X335,X425,X515)

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description	Remarks
IC501	8-759-393-47	IC M37775M7H110GP(X325,X525)	
IC502	8-759-354-30	IC AT24C01A-10SCSL7221 (X315,X335,X425,X515)	
IC502	8-759-354-31	IC AT24C02N-10SCSL7221 (X325,X525)	
IC503	8-759-248-87	IC MM1256XF-BE	
IC504	8-749-012-26	IC TFMX5400SN	
IC506	8-759-100-96	IC uPC4558G2	
⚠IC508	8-759-353-59	IC LB1643	
IC509	8-759-353-60	IC LC74790M-9105-TLM	
IC511	8-759-100-93	IC uPC393G2	
IC801	8-759-295-66	IC BA7653AF-E2	
		< JUMPER RESISTOR >	
JR001	1-216-295-91	CONDUCTOR, CHIP (2012)	
JR002	1-216-295-91	CONDUCTOR, CHIP (2012)	
JR003	1-216-296-91	CONDUCTOR, CHIP (3216)	
JR534	1-216-295-91	CONDUCTOR, CHIP (2012) (X315,X325:AS,NZ,X425,X515,X525:AS,NZ)	
JR539	1-216-295-91	CONDUCTOR, CHIP (2012)(X425)	
JR701	1-216-295-91	CONDUCTOR, CHIP (2012)	
JR703	1-216-295-91	CONDUCTOR, CHIP (2012) (X315,X335,X425,X515)	
JR721	1-216-295-91	CONDUCTOR, CHIP (2012)	
JR733	1-216-295-91	CONDUCTOR, CHIP (2012) (X315,X335,X425,X515)	
		< COIL >	
L121	1-408-974-21	INDUCTOR 22uH	
L122	1-410-667-31	INDUCTOR 22uH	
L201	1-408-980-21	INDUCTOR 68uH (X335)	
L202	1-408-982-11	INDUCTOR 100uH	
L203	1-408-982-11	INDUCTOR 100uH	
L204	1-410-514-11	INDUCTOR 27uH (X425)	
L205	1-408-982-11	INDUCTOR 100uH (X315,X335,X425,X515)	
L206	1-408-982-11	INDUCTOR 100uH	
L207	1-408-982-11	INDUCTOR 100uH (X335)	
L209	1-408-948-00	INDUCTOR 220uH (X515,X525)	
L209	1-408-985-21	INDUCTOR 180uH (X315,X325,X335,X425)	
L210	1-410-512-11	INDUCTOR 18uH (X315,X325,X335,X425)	
L212	1-410-515-11	INDUCTOR 33uH	
L213	1-410-516-11	INDUCTOR 39uH	
L214	1-410-511-11	INDUCTOR 15uH	
L215	1-410-511-11	INDUCTOR 15uH	
L216	1-408-982-11	INDUCTOR 100uH	
L218	1-408-977-21	INDUCTOR 39uH	
L301	1-410-687-11	INDUCTOR 1.2mH	
L302	1-408-970-21	INDUCTOR 10uH	
L401	1-408-982-11	INDUCTOR 100uH	
L441	1-410-513-11	INDUCTOR 22uH (X315,X335,X425,X515)	
L450	1-408-982-11	INDUCTOR 100uH	
L503	1-408-970-21	INDUCTOR 10uH	
L505	1-408-982-11	INDUCTOR 100uH	
L506	1-410-501-11	INDUCTOR 2.2uH	
L510	1-408-970-21	INDUCTOR 10uH	
L581	1-408-970-21	INDUCTOR 10uH	
L701	1-408-978-21	INDUCTOR 47uH	
L702	1-408-970-21	INDUCTOR 10uH	
L704	1-410-501-11	INDUCTOR 2.2uH	
L721	1-410-501-11	INDUCTOR 2.2uH	
L722	1-410-501-11	INDUCTOR 2.2uH	
L801	1-410-501-11	INDUCTOR 2.2uH	
L803	1-408-982-11	INDUCTOR 100uH	
L805	1-408-982-11	INDUCTOR 100uH	
		< PHOTO INTERUPTER >	
PH501	8-749-010-20	PHOTO INTERRUPTER GP3S114	
PH502	8-749-010-19	PHOTO INTERRUPTER GP3S113	

Ref. No.	Part No.	Description	Remarks
		< IC LINK >	
⚠PS121	1-532-675-21	LINK, IC 1.5A	
⚠PS122	1-532-605-00	LINK, IC 0.4A	
⚠PS301	1-532-727-11	LINK, IC 0.25A	
⚠PS501	1-532-727-11	LINK, IC 0.25A	
		< TRANSISTOR >	
⚠Q131	8-729-140-93	TRANSISTOR 2SB733-34	
Q132	8-729-421-22	TRANSISTOR UN2211	
⚠Q161	8-729-140-98	TRANSISTOR 2SD773	
Q201	8-729-421-19	TRANSISTOR UN2213 (X335)	
Q202	8-729-421-19	TRANSISTOR UN2213 (X335)	
Q203	8-729-901-06	TRANSISTOR DTA144EK (X315,X325,X425,X515,X525)	
Q205	8-729-901-06	TRANSISTOR DTA144EK (X335)	
Q209	8-729-421-19	TRANSISTOR UN2213 (X515,X525)	
Q210	8-729-421-19	TRANSISTOR UN2213 (X515,X525)	
Q211	8-729-271-21	TRANSISTOR 2SC2712Y-TE85L	
Q212	8-729-216-21	TRANSISTOR 2SA1162Y-TE85L	
Q214	8-729-271-21	TRANSISTOR 2SC2712Y-TE85L	
Q215	8-729-271-21	TRANSISTOR 2SC2712Y-TE85L	
Q216	8-729-421-19	TRANSISTOR UN2213 (X425)	
Q219	8-729-271-21	TRANSISTOR 2SC2712Y-TE85L	
Q220	8-729-271-21	TRANSISTOR 2SC2712Y-TE85L (X315,X335,X425,X515)	
Q253	8-729-901-06	TRANSISTOR DTA144EK	
Q290	8-729-271-21	TRANSISTOR 2SC2712Y-TE85L	
Q301	8-729-271-21	TRANSISTOR 2SC2712Y-TE85L	
Q302	8-729-900-51	TRANSISTOR DTA114TK	
Q303	8-729-012-31	TRANSISTOR 2SC4040-TL2-Q	
Q304	8-729-271-21	TRANSISTOR 2SC2712Y-TE85L	
Q401	8-729-216-21	TRANSISTOR 2SA1162Y-TE85L	
Q403	8-729-216-21	TRANSISTOR 2SA1162Y-TE85L	
Q502	8-729-281-53	TRANSISTOR 2SC1815-GR	
Q503	8-729-025-92	PHOTO TRANSISTOR PT380F	
Q504	8-729-025-92	PHOTO TRANSISTOR PT380F	
Q591	8-729-421-22	TRANSISTOR UN2211	
Q711	8-729-421-19	TRANSISTOR UN2213	
Q801	8-729-119-76	TRANSISTOR 2SA1175-HFE	
		< RESISTOR >	
R131	1-249-417-11	CARBON 1K 5% 1/4W F	
⚠R132	1-216-430-11	METAL OXIDE 390 5% 1W F	
R133	1-216-295-91	CONDUCTOR, CHIP (2012)	
R141	1-216-089-91	METAL GLAZE 47K 5% 1/10W	
R161	1-249-413-11	CARBON 470 5% 1/4W F	
⚠R181	1-215-857-11	METAL OXIDE 10 5% 1W F	
⚠R182	1-215-907-11	METAL OXIDE 22 5% 3W F	
R201	1-216-295-91	CONDUCTOR, CHIP (2012) (X515,X525)	
R202	1-216-295-91	CONDUCTOR, CHIP (2012) (X315,X325,X335,X425)	
R203	1-216-073-00	METAL CHIP 10K 5% 1/10W(X335)	
R204	1-216-295-91	CONDUCTOR, CHIP (2012) (EXCEPT X335)	
R204	1-216-041-00	METAL CHIP 470 5% 1/10W(X335)	
R208	1-216-295-91	CONDUCTOR, CHIP (2012)	
R209	1-216-049-91	METAL GLAZE 1K 5% 1/10W	
R213	1-216-041-00	METAL CHIP 470 5% 1/10W (X315,X335,X425,X515)	
R214	1-216-057-00	METAL CHIP 2.2K 5% 1/10W (X315,X335,X425,X515)	
R215	1-216-065-00	METAL CHIP 4.7K 5% 1/10W (X315,X335,X425,X515)	
R216	1-216-049-91	METAL GLAZE 1K 5% 1/10W (X315,X335,X425,X515)	
R217	1-216-295-91	CONDUCTOR, CHIP (2012) (X315,X335,X515)	
R218	1-216-295-91	CONDUCTOR, CHIP (2012) (X425)	
R219	1-216-073-00	METAL CHIP 10K 5% 1/10W(X335)	
R220	1-208-798-11	METAL GLAZE 4.7K 0.50% 1/10W	

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

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Ref. No.	Part No.	Description			Remarks
R221	1-216-054-00	METAL GLAZE	1.6K	5%	1/10W (X515,X525)
R221	1-216-055-00	METAL CHIP	1.8K	5%	1/10W (X315,X325,X335,X425)
R222	1-216-295-91	CONDUCTOR, CHIP			(2012)
R227	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R228	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R229	1-216-047-91	METAL GLAZE	820	5%	1/10W
R230	1-216-081-00	METAL CHIP	22K	5%	1/10W
R231	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R232	1-216-041-00	METAL CHIP	470	5%	1/10W
R233	1-216-045-00	METAL CHIP	680	5%	1/10W
R234	1-216-050-00	METAL GLAZE	1.1K	5%	1/10W
R235	1-216-041-00	METAL CHIP	470	5%	1/10W
R236	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R237	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R238	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R239	1-216-041-00	METAL CHIP	470	5%	1/10W
R240	1-216-041-00	METAL CHIP	470	5%	1/10W
R241	1-216-047-91	METAL GLAZE	820	5%	1/10W
R242	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R243	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R244	1-216-045-00	METAL CHIP	680	5%	1/10W
R245	1-216-041-00	METAL CHIP	470	5%	1/10W
R246	1-216-043-91	METAL GLAZE	560	5%	1/10W
R247	1-216-049-91	METAL GLAZE	1K	5%	1/10W (X515,X525)
R247	1-216-045-00	METAL CHIP	680	5%	1/10W (X315,X325,X335,X425)
R248	1-216-045-00	METAL CHIP	680	5%	1/10W (X515,X525)
R249	1-216-073-00	METAL CHIP	10K	5%	1/10W (X515,X525)
R250	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R251	1-216-041-00	METAL CHIP	470	5%	1/10W
R271	1-216-295-91	CONDUCTOR, CHIP			(2012) (EXCEPT X425)
R272	1-216-069-00	METAL CHIP	6.8K	5%	1/10W(X425)
R275	1-216-295-91	CONDUCTOR, CHIP			(2012)
R278	1-216-073-00	METAL CHIP	10K	5%	1/10W
R285	1-216-073-00	METAL CHIP	10K	5%	1/10W
R286	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R287	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R288	1-216-073-00	METAL CHIP	10K	5%	1/10W
R290	1-216-081-00	METAL CHIP	22K	5%	1/10W
R291	1-216-099-00	METAL CHIP	120K	5%	1/10W
R292	1-216-095-00	METAL CHIP	82K	5%	1/10W
R293	1-216-073-00	METAL CHIP	10K	5%	1/10W
R294	1-216-073-00	METAL CHIP	10K	5%	1/10W
R295	1-216-077-00	METAL CHIP	15K	5%	1/10W
R296	1-216-077-00	METAL CHIP	15K	5%	1/10W
R298	1-216-097-91	METAL GLAZE	100K	5%	1/10W
R301	1-216-001-00	METAL CHIP	10	5%	1/10W
R302	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R303	1-216-097-91	METAL GLAZE	100K	5%	1/10W
R304	1-216-043-91	METAL GLAZE	560	5%	1/10W
R305	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R306	1-216-093-00	METAL CHIP	68K	5%	1/10W
R307	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R308	1-216-093-00	METAL CHIP	68K	5%	1/10W
R309	1-216-129-00	METAL CHIP	2.2M	5%	1/10W
R310	1-216-081-00	METAL CHIP	22K	5%	1/10W (EXCEPT X425)
R310	1-216-079-00	METAL CHIP	18K	5%	1/10W(X425)
R311	1-216-304-11	METAL CHIP	3.3	5%	1/10W
R312	1-216-065-00	METAL CHIP	4.7K	5%	1/10W (EXCEPT X325:AS)
R313	1-216-083-00	METAL CHIP	27K	5%	1/10W (EXCEPT X425)
R313	1-216-089-91	METAL GLAZE	47K	5%	1/10W(X425)
R314	1-216-075-00	METAL CHIP	12K	5%	1/10W
R315	1-216-081-00	METAL CHIP	22K	5%	1/10W
R316	1-216-069-00	METAL CHIP	6.8K	5%	1/10W (EXCEPT X425)
R316	1-216-071-00	METAL CHIP	8.2K	5%	1/10W(X425)

Ref. No.	Part No.	Description			Remarks
R317	1-216-073-00	METAL CHIP	10K	5%	1/10W
R318	1-216-073-00	METAL CHIP	10K	5%	1/10W (EXCEPT X425)
R318	1-216-071-00	METAL CHIP	8.2K	5%	1/10W(X425)
R319	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R320	1-216-109-00	METAL CHIP	330K	5%	1/10W
R321	1-216-073-00	METAL CHIP	10K	5%	1/10W
R322	1-216-085-00	METAL CHIP	33K	5%	1/10W
R323	1-216-073-00	METAL CHIP	10K	5%	1/10W
R324	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R325	1-216-099-00	METAL CHIP	120K	5%	1/10W
R326	1-216-041-00	METAL CHIP	470	5%	1/10W
R402	1-216-057-00	METAL CHIP	2.2K	5%	1/10W (EXCEPT X325:NZ,X525:NZ)
R403	1-216-073-00	METAL CHIP	10K	5%	1/10W (X325:AS,NZ,X525:AS,NZ)
R404	1-216-073-00	METAL CHIP	10K	5%	1/10W (X325:SA,X525:SA)
R408	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R411	1-216-073-00	METAL CHIP	10K	5%	1/10W
R412	1-216-073-00	METAL CHIP	10K	5%	1/10W
R421	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R422	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R423	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R424	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R425	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R426	1-216-295-91	CONDUCTOR, CHIP			(2012)
R431	1-216-295-91	CONDUCTOR, CHIP			(2012) (X315,X325:AS,NZ,X425,X515,X525:AS,NZ)
R432	1-216-295-91	CONDUCTOR, CHIP			(2012) (X315,X325:AS,NZ,X425,X515,X525:AS,NZ)
R441	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R442	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R443	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R444	1-216-013-00	METAL CHIP	33	5%	1/10W
R450	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R451	1-216-049-91	METAL GLAZE	1K	5%	1/10W (X315,X335,X425,X515)
R453	1-216-041-00	METAL CHIP	470	5%	1/10W
R454	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R455	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R457	1-216-295-91	CONDUCTOR, CHIP			(2012)
R471	1-216-073-00	METAL CHIP	10K	5%	1/10W
R472	1-216-295-91	CONDUCTOR, CHIP			(2012)
R473	1-216-073-00	METAL CHIP	10K	5%	1/10W
R474	1-216-041-00	METAL CHIP	470	5%	1/10W
R475	1-216-041-00	METAL CHIP	470	5%	1/10W
R476	1-216-041-00	METAL CHIP	470	5%	1/10W
R477	1-216-041-00	METAL CHIP	470	5%	1/10W
R478	1-216-041-00	METAL CHIP	470	5%	1/10W
R480	1-216-689-11	METAL CHIP	39K	0.5%	1/10W (EXCEPT X325:SA,X525:SA)
R501	1-216-073-00	METAL CHIP	10K	5%	1/10W
R502	1-216-073-00	METAL CHIP	10K	5%	1/10W
R503	1-216-073-00	METAL CHIP	10K	5%	1/10W
R504	1-216-073-00	METAL CHIP	10K	5%	1/10W
R505	1-216-121-91	METAL GLAZE	1M	5%	1/10W
R506	1-216-041-00	METAL CHIP	470	5%	1/10W
R507	1-218-179-11	METAL GLAZE	10M	5%	1/10W
R508	1-216-089-91	METAL GLAZE	47K	5%	1/10W (EXCEPT X325)
R509	1-216-001-00	METAL CHIP	10	5%	1/10W
R510	1-216-113-00	METAL CHIP	470K	5%	1/10W
R511	1-216-105-91	METAL GLAZE	220K	5%	1/10W
R513	1-216-073-00	METAL CHIP	10K	5%	1/10W
R514	1-216-073-00	METAL CHIP	10K	5%	1/10W (X315,X335,X515,X525)
R514	1-216-089-91	METAL GLAZE	47K	5%	1/10W (X325:AS,NZ)
R515	1-216-061-00	METAL CHIP	3.3K	5%	1/10W(X515)
R515	1-216-073-00	METAL CHIP	10K	5%	1/10W (X325:SA,X425:PS,ME)
R515	1-216-069-00	METAL CHIP	6.8K	5%	1/10W (X315,X335)
R515	1-216-089-91	METAL GLAZE	47K	5%	1/10W (X325:AS,NZ)

Ref. No.	Part No.	Description				Remarks
R516	1-216-085-00	METAL CHIP	33K	5%	1/10W	
R517	1-216-083-00	METAL CHIP	27K	5%	1/10W	
R518	1-216-033-00	METAL CHIP	220	5%	1/10W	
R519	1-216-033-00	METAL CHIP	220	5%	1/10W	
R521	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R522	1-216-095-00	METAL CHIP	82K	5%	1/10W	
R523	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R524	1-216-089-91	METAL GLAZE	47K	5%	1/10W	
R525	1-216-121-91	METAL GLAZE	1M	5%	1/10W	
R526	1-216-045-00	METAL CHIP	680	5%	1/10W	
R527	1-216-117-00	METAL CHIP	680K	5%	1/10W	
R528	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R529	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R530	1-216-093-00	METAL CHIP	68K	5%	1/10W	
R531	1-216-049-91	METAL GLAZE	1K	5%	1/10W	
R532	1-216-089-91	METAL GLAZE	47K	5%	1/10W	
R533	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	
R534	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R537	1-216-067-00	METAL CHIP	5.6K	5%	1/10W	(X515,X425,X315,X525:SA,X325:SA)
R538	1-216-067-00	METAL CHIP	5.6K	5%	1/10W	(X335,X525:AS,NZ,X325:AS,NZ)
R540	1-216-061-00	METAL CHIP	3.3K	5%	1/10W	
R541	1-216-061-00	METAL CHIP	3.3K	5%	1/10W	
R551	1-216-089-91	METAL GLAZE	47K	5%	1/10W	
R552	1-216-081-00	METAL CHIP	22K	5%	1/10W	
R553	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R558	1-216-075-00	METAL CHIP	12K	5%	1/10W	
R559	1-216-081-00	METAL CHIP	22K	5%	1/10W	
R561	1-216-089-91	METAL GLAZE	47K	5%	1/10W	
R562	1-216-033-00	METAL CHIP	220	5%	1/10W	
R563	1-216-033-00	METAL CHIP	220	5%	1/10W	
R564	1-216-089-91	METAL GLAZE	47K	5%	1/10W	
R565	1-216-113-00	METAL CHIP	470K	5%	1/10W	
R566	1-216-113-00	METAL CHIP	470K	5%	1/10W	
R567	1-247-807-31	CARBON	100	5%	1/4W	
R568	1-247-807-31	CARBON	100	5%	1/4W	
R569	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R570	1-216-049-91	METAL GLAZE	1K	5%	1/10W	
R571	1-216-089-91	METAL GLAZE	47K	5%	1/10W	
R572	1-216-089-91	METAL GLAZE	47K	5%	1/10W	
R573	1-216-089-91	METAL GLAZE	47K	5%	1/10W	
R574	1-216-089-91	METAL GLAZE	47K	5%	1/10W	
R575	1-216-089-91	METAL GLAZE	47K	5%	1/10W	
R576	1-216-295-91	CONDUCTOR, CHIP		(	2012)	
R578	1-216-089-91	METAL GLAZE	47K	5%	1/10W	
R579	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	(X425,X515)
R581	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R582	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	
R583	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	
R584	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R585	1-216-059-00	METAL CHIP	2.7K	5%	1/10W	
R586	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R587	1-216-069-00	METAL CHIP	6.8K	5%	1/10W	(EXCEPT X325:SA,X525:SA)
R588	1-216-077-00	METAL CHIP	15K	5%	1/10W	(EXCEPT X325:SA,X525:SA)
R589	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	(X425,X515)
R590	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R591	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R592	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R593	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R594	1-216-059-00	METAL CHIP	2.7K	5%	1/10W	
R595	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R596	1-216-069-00	METAL CHIP	6.8K	5%	1/10W	(X315,X325:AS,NZ,X425,X515,X525:AS,NZ)
R597	1-216-077-00	METAL CHIP	15K	5%	1/10W	(X425)
R599	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R702	1-216-295-91	CONDUCTOR, CHIP		(	2012)	(X325,X525)
R705	1-216-025-91	METAL GLAZE	100	5%	1/10W	(X315,X335,X425,X515)
R706	1-216-295-91	CONDUCTOR, CHIP		(	2012)	
R709	1-216-295-91	CONDUCTOR, CHIP		(	2012)	
R710	1-216-025-91	METAL GLAZE	100	5%	1/10W	
⚠R712	1-212-893-00	FUSIBLE	330	5%	1/4W	F
R714	1-216-295-91	CONDUCTOR, CHIP		(	2012)	(X325:AS,NZ,X525:AS,NZ)
R802	1-216-022-00	METAL CHIP	75	5%	1/10W	
R803	1-208-754-11	METAL GLAZE	68	0.50%	1/10W	
R804	1-216-295-91	CONDUCTOR, CHIP		(	2012)	
R805	1-216-043-91	METAL GLAZE	560	5%	1/10W	
R809	1-216-017-91	METAL GLAZE	47	5%	1/10W	
R811	1-249-407-11	CARBON	150	5%	1/4W	F
R812	1-249-407-11	CARBON	150	5%	1/4W	F
R813	1-216-017-91	METAL GLAZE	47	5%	1/10W	
R814	1-216-017-91	METAL GLAZE	47	5%	1/10W	

< SWITCH >

S501	1-570-953-11	SWITCH, PUSH (1 KEY)	
S502	1-571-532-32	SWITCH, TACTIL (STANDBY)	
S503	1-571-532-32	SWITCH, TACTIL (EJECT)	
S504	1-571-532-32	SWITCH, TACTIL (REC)	
S506	1-571-532-32	SWITCH, TACTIL (PROGRAM +)	
S507	1-572-907-11	SWITCH, SLIDE (NTSC PB)	(EXCEPT X325:SA,X525:SA)
S511	1-571-532-32	SWITCH, TACTIL (PAUSE)	
S512	1-571-532-32	SWITCH, TACTIL (PROGRAM -)	
S513	1-762-211-11	SWITCH, SLIDE (COLOR SYSTEM)	(X315,X325:AS,NZ,X515,X525:AS,NZ)
S513	1-762-207-11	SWITCH, SLIDE (COLOR SYSTEM)	(X425)
S701	1-571-588-11	SWITCH, SLIDE (TV SYSTEM)	(X315,X335,X425,X515)

< TRANSFORMER >

T301	1-423-414-11	TRANSFORMER, BIAS OSCILLATION
T401	1-233-527-11	FILTER, TRAP

< TUNER >

TU702	1-693-319-11	TUNER (BTF-2MG402)	(X315,X325:AS,NZ,X335,X425,X515,X525:AS,NZ)
TU702	1-693-329-11	TUNER (BTF-2MU401)	(X325:SA,X525:SA)

< VIBRATOR >

X501	1-760-494-11	VIBRATOR, CRYSTAL 16MHz
X502	1-579-463-11	VIBRATOR, CRYSTAL 32KHz
X541	1-577-289-11	VIBRATOR, CRYSTAL 17.73MHz

* A-6782-876-A RP-196 BOARD, COMPLETE(X515,X525)
****

* A-6782-878-A RP-196 BOARD, COMPLETE
****
(X315,X325,X335,X425)
(Ref.No.2,000 Series)

3-966-840-02 CASE, SHIELD (MAIN) (PAL), RP

< CAPACITOR >

C001	1-163-033-91	CERAMIC CHIP	0.022uF	50V
C002	1-163-033-91	CERAMIC CHIP	0.022uF	50V
C004	1-163-033-91	CERAMIC CHIP	0.022uF	50V
C005	1-163-033-91	CERAMIC CHIP	0.022uF	50V
C006	1-163-033-91	CERAMIC CHIP	0.022uF	50V
C007	1-163-033-91	CERAMIC CHIP	0.022uF	50V
C008	1-163-033-91	CERAMIC CHIP	0.022uF 50V	(X515,X525)
C010	1-163-033-91	CERAMIC CHIP	0.022uF 50V	(X515,X525)
C011	1-163-033-91	CERAMIC CHIP	0.022uF 50V	(X515,X525)
C012	1-163-033-91	CERAMIC CHIP	0.022uF 50V	(X515,X525)

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

RP-196 SW-269

Ref. No.	Part No.	Description			Remarks
C013	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C014	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C015	1-124-584-00	ELECT	100uF	20%	10V
C016	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C017	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C018	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C019	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C020	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C021	1-124-584-00	ELECT	100uF	20%	10V
C024	1-163-127-00	CERAMIC CHIP	270PF	5%	50V
C027	1-163-241-11	CERAMIC CHIP	39PF	5%	50V (X515,X525)
C027	1-163-031-11	CERAMIC CHIP	0.01uF		50V (X315,X325,X335,X425)
C029	1-163-241-11	CERAMIC CHIP	39PF	5%	50V
C030	1-163-241-11	CERAMIC CHIP	39PF	5%	50V
C031	1-163-235-11	CERAMIC CHIP	22PF	5%	50V
C032	1-163-235-11	CERAMIC CHIP	22PF	5%	50V (X515,X525)
		< CONNECTOR >			
CN001	1-563-585-11	CONNECTOR, FLEXIBLE 8P			
* CN002	1-564-029-00	PIN, CONNECTOR 4P			
CN003	1-573-826-11	CONNECTOR, BOARD TO BOARD 12P			
		< IC >			
IC001	8-759-352-17	IC HA118195NT (X515,X525)			
IC001	8-759-357-84	IC HA118295NT (X315,X325,X335,X425)			
		< COIL >			
L003	1-408-982-11	INDUCTOR	100uH		
L004	1-408-982-11	INDUCTOR	100uH		
L006	1-408-948-00	INDUCTOR	220uH		
		< TRANSISTOR >			
Q001	8-729-271-21	TRANSISTOR	2SC2712Y-TE85L		
Q002	8-729-216-21	TRANSISTOR	2SA1162Y-TE85L		
		< RESISTOR >			
R001	1-216-045-00	METAL CHIP	680	5%	1/10W
R002	1-216-045-00	METAL CHIP	680	5%	1/10W (X515,X525)
R003	1-216-055-00	METAL CHIP	1.8K	5%	1/10W (X515,X525)
R003	1-216-051-00	METAL CHIP	1.2K	5%	1/10W (X315,X325,X335,X425)
R004	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R005	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R006	1-216-073-00	METAL CHIP	10K	5%	1/10W
R007	1-216-081-00	METAL CHIP	22K	5%	1/10W
R012	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R013	1-216-049-91	METAL GLAZE	1K	5%	1/10W
R014	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R015	1-216-025-91	METAL GLAZE	100	5%	1/10W (X315,X325,X335,X425)
R017	1-163-241-11	CERAMIC CHIP	39PF	5%	50V (X515,X525)
R017	1-216-025-91	METAL GLAZE	100	5%	1/10W (X315,X325,X335,X425)
R018	1-216-057-00	METAL CHIP	2.2K	5%	1/10W

---

* A-6794-149-A SW-269 BOARD, COMPLETE
****
(X315,X335,X325,X525)
(Ref.No.1,000 Series)

< CONNECTOR >

CN691 1-506-483-21 PIN, CONNECTOR 4P

< RESISTOR >

R691	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R692	1-216-053-00	METAL CHIP	1.5K	5%	1/10W

Ref. No.	Part No.	Description	Remarks
		< SWITCH >	
S691	1-571-977-11	SWITCH, TACTIL (FF)	
S692	1-571-977-11	SWITCH, TACTIL (PLAY)	
S693	1-571-977-11	SWITCH, TACTIL (STOP)	
S694	1-571-977-11	SWITCH, TACTIL (REW)	

MISCELLANEOUS
****

⚠54	1-468-073-11	POWER BLOCK	
⚠54	1-468-095-11	POWER BLOCK (SR705)	
158	1-500-144-11	HEAD, FE	
165	1-506-485-11	PIN, CONNECTOR 6P	
203	1-759-183-11	DRUM ASSY DZH-78A-R (M901) (X315,X325,X335,X425)	
203	8-848-682-11	DRUM ASSY DZH-74B/Q-RP (M901) (X515/X525)	
251	1-766-723-11	CONNECTOR, BOARD TO BOAR 3P	
260	1-762-076-11	SWITCH, ROTARY	
D503	8-719-048-26	DIODE GL528V1	
M902	1-698-409-11	MOTOR, DC SCV-0801A/Z-NP	
M902	1-698-409-14	MOTOR, DC (CAPSTAN)	
M903	X-3943-883-1	MOTOR ASSY, CAM	
Q503	8-729-025-92	PHOTO TRANSISTOR PT380F	
Q504	8-729-025-92	PHOTO TRANSISTOR PT380F	

ACCESSORIES & PACKING MATERIALS
****

	1-473-472-31	REMOTE COMMANDER(RMT-V181B)(X515)
	1-473-472-41	REMOTE COMMANDER(RMT-V181C)(X525:AS,NZ)
	1-473-472-51	REMOTE COMMANDER(RMT-V181D)(X525:SA)
	1-473-472-61	REMOTE COMMANDER(RMT-V181E) (X425,X315,X335)
	1-473-472-71	REMOTE COMMANDER(RMT-V181F)(X325:SA)
	1-473-472-81	REMOTE COMMANDER(RMT-V181G)(X325:AS,NZ)
⚠	1-569-008-21	ADAPTER, CONVERSION 2P (X315:ME,SG,X335,X425:ME,X515:ME,SG)
⚠	1-575-131-11	CORD, POWER (X315,X325:SA,X335,X425,X515,X525:SA)
	1-696-593-11	CORD, CONNECTION (PAL)(1.5m)
⚠	1-696-819-11	CORD, POWER (X325:AS,NZ,X525:AS,NZ)
	3-810-182-11	MANUAL, INSTRUCTION(ENGLISH)(X315)
	3-810-182-21	MANUAL, INSTRUCTION(CHINESE)(X315:PS)
	3-810-182-31	MANUAL, INSTRUCTION(ARABIC)(X315:ME,SG)
	3-810-182-41	MANUAL, INSTRUCTION(PERSIAN)(X315:SG)
	3-810-182-71	MANUAL, INSTRUCTION(URDU)(X315:SG)
	3-810-299-11	MANUAL, INSTRUCTION(ENGLISH)(X515)
	3-810-299-21	MANUAL, INSTRUCTION(CHINESE)(X515:PS)
	3-810-299-31	MANUAL, INSTRUCTION(ARABIC)(X515:ME,SG)
	3-810-299-41	MANUAL, INSTRUCTION(PERSIAN)(X515:SG)
	3-810-299-71	MANUAL, INSTRUCTION(URDU)(X515:SG)
	3-810-300-11	MANUAL, INSTRUCTION(ENGLISH)(X425)
	3-810-300-21	MANUAL, INSTRUCTION(CHINESE)(X425:PS)
	3-810-300-31	MANUAL, INSTRUCTION(ARABIC)(X425:ME)
	3-810-302-11	MANUAL, INSTRUCTION(ENGLISH)(X325:AS,NZ)
	3-810-302-21	MANUAL, INSTRUCTION(ENGLISH)(X325:SA)
	3-810-303-11	MANUAL, INSTRUCTION(ENGLISH)(X525:AS,NZ)
	3-810-303-21	MANUAL, INSTRUCTION(ENGLISH)(X525:SA)
	3-810-304-11	MANUAL, INSTRUCTION (ENGLISH,FRENCH,ARABIC)(X335)
*	3-961-581-01	SHEET, PROTECTION
*	3-967-169-01	CUSHION
*	3-967-582-01	INDIVIDUAL CARTON (X315:PS)
*	3-967-582-11	INDIVIDUAL CARTON (X315:ME)
*	3-967-582-21	INDIVIDUAL CARTON (X325:AS)
*	3-967-582-41	INDIVIDUAL CARTON (X315:SG)
*	3-967-582-51	INDIVIDUAL CARTON (X335)
*	3-967-582-61	INDIVIDUAL CARTON (X325:SA)
*	3-967-582-81	INDIVIDUAL CARTON (X525:SA)
*	3-967-582-91	INDIVIDUAL CARTON (X525:AS)

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description	Remarks
*	3-968-029-01	INDIVIDUAL CARTON (X515:PS)	
*	3-968-029-41	INDIVIDUAL CARTON (X515:ME)	
*	3-968-029-51	INDIVIDUAL CARTON (X515:SG)	
*	3-968-029-61	INDIVIDUAL CARTON (X425:PS)	
*	3-968-029-71	INDIVIDUAL CARTON (X425:ME)	
*	3-968-029-81	INDIVIDUAL CARTON (X525:NZ)	
*	3-968-029-91	INDIVIDUAL CARTON (X325:NZ)	

[redacted]

Ref. No.	Part No.	Description	Remarks

****
HARDWARE LIST
****

#1	7-682-547-04	SCREW +P 3X6	
#2	7-685-648-79	SCREW +BVTP	3X12 TYPE2 IT-3
#3	7-685-646-79	SCREW (3X8)	
#7	7-624-106-04	STOP RING 3.0, TYPE -E	
#8	7-682-645-01	SCREW +PS 3X4	
#9	7-621-772-08	SCREW +B	2X3

SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/ X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA

SECTION 6

INTERFACE, IC PIN FUNCTION DESCRIPTION

6-1. SYSTEM CONTROL — MECHANISM BLOCK INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	EJECTED	CASSETTE LOADING	CASSETTE UNLOADING	TAPE THREADING	TAPE UNTHREADING	STOP	FF	REW	PB	REC
CAM 2	MA-249 Board IC501 ㉛	O	*5	H	L	H	L	*5	*5	*5	*5	*5
CAM 1	MA-249 Board IC501 ㉜	O	*5	*5	*5	*5	*5	*5	*5	*5	*5	*5
MODE 1	MA-249 Board IC501 ㉚	I	—	—	—	—	—	H	H	H	H	H
MODE 2	MA-249 Board IC501 ㉙	I	—	—	—	—	—	L	L	L	H	H
MODE 3	MA-249 Board IC501 ㉘	I	—	—	—	—	—	H	H	H	L	L
MODE 4	MA-249 Board IC501 ㉗	I	—	—	—	—	—	H	L	L	L	L
REC PRF	MA-249 Board IC501 ㊹	I	L	*1	*1	*1	*1	*1	*1	*1	*1	*1
T REEL FG	MA-249 Board IC501 ㉞	I	H/L	H/L	H/L	H/L	H/L	H/L	*2	*2	*2	*2
S REEL FG	MA-249 Board IC501 ㉝	I	H/L	H/L	H/L	*2	*2	H/L	*2	*2	*2	*2
END LED	MA-249 Board IC501 ㊺	O	L	*3	*3	*3	*3	*3	*3	*3	*3	*3
T SENS	MA-249 Board IC501 ㊿	I	*3	*3	*3	*4	*4	*4	*4	*4	*4	*4
S SENS	MA-249 Board IC501 ㊾	I	*3	*3	*3	*4	*4	*4	*4	*4	*4	*4

*1. "H" when erasing protection tab is bent. "L" when not bent.
*2. Pulse of period in proportion to reel rotating speed.
*3. Approx. 2 msec period "H" pulse.
*4. Normally "L". 2 msec period "H" pulse when tape top or tape end is detected.
*5. Hi-Z

6-2. SYSTEM CONTROL — SERVO PERIPHERAL CIRCUIT INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	STOP	FF	REW	TAPE THREADING	TAPE UNTHREADING	PB	REC
REC CTL	MA-249 Board IC501 ㉑	O	*11	*11	*11	*11	*11	*11	*1
PB CTL	MA-249 Board IC501 ㉕	I	H	*4	*4	—	—	*1	*1
DRUM PG	MA-249 Board IC501 ㉓	I	*5	*5	*5	*5	*5	*5	*5
DRUM FG	MA-249 Board IC501 ㉔	I	*6	*6	*6	*6	*6	*6	*6
CAP FG	MA-249 Board IC501 ㊼	I	H/L	*7	*7	*8	*8	*7	*7
CAP RVS	MA-249 Board IC501 ⑰	O	H/L	L	H	L	H	L	L
CAP ERR	MA-249 Board IC501 ④	O	L	*10	*10	*10	*10	*10	*10
DRUM ERR	MA-249 Board IC501 ③	O	*10	*10	*10	*10	*10	*10	*10
SLOW CONT	MA-249 Board IC501 ⑯	O	*12	*12	*12	*12	*12	*12	*12

*1. 25Hz pulse.
*2. 3 value output of "H", "L" and "Hi-Z (2.5V)."
*3. Unstable period Pulse.
*4. Pulse of period in proportion to tape speed.
*5. 25Hz "H" pulse.
*6. 300Hz pulse.
*7. Pulse of period in proportion to tape speed.
*8. Unstable period pulse.
*9. Pulse at tape running.
*10. DC voltage 1 ~ 5V.
*11. Hi-Z (2.5V).
*12. "L" during forward slow, "H" during reverse slow. "Hi-Z" in other modes.

6-3. SYSTEM CONTROL — SYSTEM CONTROL PERIPHERAL CIRCUIT INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	I/O level
$\overline{\text{RESET}}$	MA-249 Board IC501 ㊲	I	Normally "H". "L" when service interruption is detected or restored.
SO 1	MA-249 Board IC501 ㊼	O	Serial communication data to video and audio microprocessor.
SCK	MA-249 Board IC501 ㊾	I	Serial communication clock with video and audio microprocessor.

6-4. SYSTEM CONTROL AND RF MODULATOR — INPUT SELECTION BLOCK INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	I/O level
LINE 1	MA-249 Board IC501 ⑭	O	Input select control signal.

6-5. SYSTEM CONTROL — VIDEO BLOCK INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	STOP/FF /REW	TAPE LOADING	TAPE UNLOADING	PB	REC	REC PAUSE
V-PB	MA-249 Board IC501 ㊾	O	H	H	H	L	H	H
RF SWP	MA-249 Board IC501 ⑳	O	*1	*1	*1	*1	*1	*1
Q VD	MA-249 Board IC501 ⑱	O	L	L	L	*2	L	L
$\overline{\text{SP}}$	MA-249 Board IC501 ㊽	O	*3	*3	*3	*4	*3	*3
LP	MA-249 Board IC501 ⑮	O	*6	*6	*6	*6	*6	*6
REC. P	MA-249 Board IC501 ②	O	L	L	L	L	L	H
C SYNC	MA-249 Board IC501 ㊸	I	*5	*5	*5	*5	*5	*5

*1. Synchronized with drum rotation. 25Hz 50% duty pulse.
*2. Normally "L". "H" when video signal is not generated.
*3. Selected by SP/EP. SP mode: "L", EP mode: "H".
*4. Selected by tape recording mode.

sig/mod	SP	LP	EP
SP (10)	L	H	H
LP (12)	L	H	L

*5. Composite sync signal (positive).
*6. Selected by SP/EP/LP mode. SP mode: "L", EP mode: "H".

6-6. SYSTEM CONTROL — AUDIO BLOCK INTERFACE (MA-249 board IC501)

Signal	Pin No.	I/O	STOP/ FF/REW	TAPE LOADING	TAPE UNLOADING	PB	REC	REC PAUSE
NA PB	MA-249 Board IC501 ⑤	O	L	L	L	H	L	L
A MUTE	MA-249 Board IC501 ⑥	O	L	L	L	L	L	L
REC P	MA-249 Board IC501 ②	O	L	L	L	L	L	H
SP	MA-249 Board IC501 ㊽	O	*1	*1	*1	*2	*1	*1

*1. Selected by SP/EP selector. SP mode: "L", EP mode: "H".
*2. Selected by tape recording mode. SP mode: "L", EP mode: "H".

6-7. SERVO/SYSTEM CONTROL MICROPROCESSOR M37775M (MA-249 board IC501)

Pin No.	Name	I/O	Function
1	MESECAM	O	MESECAM signal output.
2	RECP	O	"H" when rec. pause mode.
3	DRUM	O	Drum error signal output.
4	CAP ERR	O	Capstan error signal output.
5	NAPB	O	"H" output when pb mode.
6	AMUTE	O	Audio mute signal output.
7	PLL DATA	O	PLL data output.
8	PLL CLK	O	PLL clock output.
9	I2C CLK	O	I2C clock signal output.
10	T-ENABLE	O	Tuner enable signal output.
11	REMOCON	I	SIRCS signal input.
12	$\overline{BG}$	O	"H" when BG mode.
13	SECAM	I	SECAM system select. Built-in or not.
14	LINE1	O	"H" when input is LINE signal.
15	LP	O	"H" when LP mode.
16	CTL GAIN	O	CTL gain control.
17	CAPRVS	O	Capstan direction control signal. "H" when tape running reverse direction
18	QVD	O	Quasi V signal.
19	DMS MODE 3	I	DMS mode signal input.
20	RFSWP	O	RF switching pulse output
21	REC-CTL	I	REC CTL input.
22	PWR_CONT	O	Power control signal.
23	DRMPG	I	DRUM pg signal input.
24	DRMFG	I	DRUM fg signal input.
25	PBCTL	I	PB CTL signal input.
26	VCC	I	VCC
27	MODE4	I	Mode switch signal input.
28	MODE3	I	Mode switch signal input
29	MODE2	I	Mode switch signal input.
30	MODE1	I	Mode switch signal input.
31	CAM 2	O	CAM motor control signal.
32	CAM 1	O	CAM motor control signal.
33	SREEL	I	Supply reel signal input.
34	TREEL	I	Take up reel signal input.
35	GND	I	GND
36	GND	I	GND
37	RESET_	I	Reset signal input. Active "L"
38	16M	—	For crystal 16MHz.
39	16M	—	For crystal 16MHz.
40	VCC	I	VCC
41	GND	I	GND
42	32K	—	For crystal 32KHz.
43	32K	—	For crystal 32KHz.
44	RECPRF	I	Recording proof signal input.
45	END_LED	O	END sensor signal output.
46	DMS MODE 4	I	DMS mode signal input.
47	SYSTEM 2/ 3.58MHz/LP JOG	O	Each system control signal.
48	APC+NC1	O	APC control signal output.
49	NTSC_	O	NTSC detect signal output.
50	NT-JUDGE	O	NTSC detect signal output.

Pin No.	Name	I/O	Function
51	DMS MODE 2	I	DMS mode signal input.
52	G1	O	Fluorescent display control signal.
53	G2	O	Fluorescent display control signal.
54	G3	O	Fluorescent display control signal.
55	G4	O	Fluorescent display control signal.
56	P19	O	Fluorescent display control signal.
57	P18	O	Fluorescent display control signal.
58	P17	O	Fluorescent display control signal.
59	P16	O	Fluorescent display control signal.
60	P15	O	Fluorescent display control signal.
61	P14	O	Fluorescent display control signal.
62	P13	O	Fluorescent display control signal.
63	P12	O	Fluorescent display control signal.
64	P11	O	Fluorescent display control signal.
65	P10	O	Fluorescent display control signal.
66	P9	O	Fluorescent display control signal.
67	P8	O	Fluorescent display control signal.
68	P7	O	Fluorescent display control signal.
69	P6	O	Fluorescent display control signal.
70	P5	O	Fluorescent display control signal.
71	P4	O	Fluorescent display control signal.
72	P3	O	Fluorescent display control signal.
73	P2	O	Fluorescent display control signal.
74	P1	O	Fluorescent display control signal.
75	-9V	I	VCC (-9v input)_
76	VCC	I	VCC
77	SO1	O	Serial data signal output.
78	PAL60	O	Video control signal output.
79	SCK1	O	Serial clock signal output.
80	OSD-CS_	O	OSD chip select signal output.
81	VCC	I	VCC
82	AD	I	VCC for A/D convertor.
83	APC+PWM	O	APC PWM signal output.
84	POWER-FAIL_	I	Power fail detect signal input.
85	TU-AFT	I	Tuner AFT signal input.
86	APC+PWM IN	I	APC PWM signal input.
87	FUNC-KEY2	I	Signal input from function key.
88	FUNC-KEY1	I	Signal input from function key.
89	SSENS	I	Supply sensor signal input.
90	TSENS	I	Take up sensor signal input.
91	AV_CONT	O	AV control signal output.
92	VIDEO-RF	I	Video RF signal input.
93	CSYNC	I	Composite sync signal input.
94	APC+NC2	O	APC control signal output.
95	APC-ON	O	APC control signal output.
96	JOG_	O	"H" When JOG mode.
97	CAPFG	I	Capstan fg signal input.
98	SP_	O	"L" when SP mode.
99	VPB_	O	"L" when video play back mode.
100	RENTAL	O	Video picture control signal output.

SECTION 7
ADJUSTMENTS

7-1. MECHANICAL ADJUSTMENTS

For the mechanical adjustments, please refer to the "VHS MECHANICAL ADJUSTMENT MANUAL IV (H MECHANISM)" (9-973-623-11).

7-2. ELECTRICAL ADJUSTMENTS

See the adjusting part location diagram from on page 7-6 for the adjustment.

2-1. PREPARATION BEFORE ADJUSTMENT

2-1-1. Equipment Required

The measuring instruments used for this alignment include:

1) Monitor TV
2) Oscilloscope, dual-trace, bandwidth of 30MHz or more, with delay mode (A probe 10:1 should be used unless otherwise specified.)
3) Frequency counter
4) Pattern generator
5) Digital voltmeter
6) Audio generator
7) Audio level meter
8) Audio distortion meter
9) Audio attenuator
10) Alignment tape
    MH-2 Part No. : H7099052H

2-1-2. Equipment Connection

Unless otherwise specified, connect and adjust the measuring instruments as shown in the following diagram.

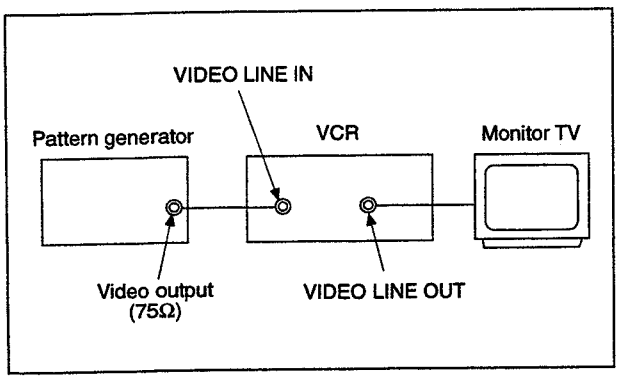


Fig. 7-2-1.

2-1-3. Input Signal Check

Video signal produced by a pattern generator is used as an adjustment signal to perform electrical alignment for this unit. This video signal must satisfy the specification.

Unless otherwise specified, place the switches and controls of this unit in the following positions:

- CHANNEL switch .....LINE

Connect an oscilloscope to the Video Input terminal. Check that the synchronizing signal of the Y signal has an amplitude of approximately 0.7V and that the burst signal has an amplitude of approximately 0.3V and its waveform is flat. And check that the level ratio of burst signal to "red" signal is 0.30 : 0.66. The video signal (color bar) used for electrical aligning this unit is shown in Fig. 7-2-2.

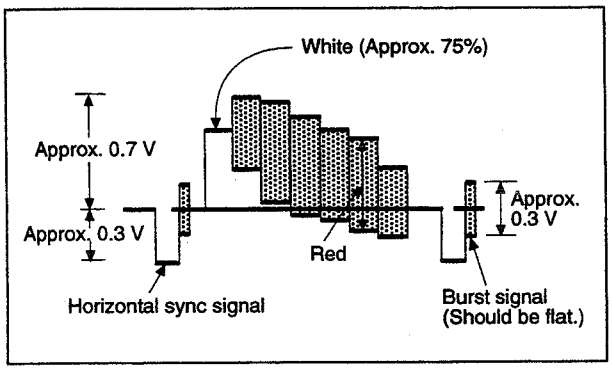


Fig. 7-2-2. Color Bar Signals of Pattern Generator

2-1-4. Alignment Tape

- Contents of MH-2 (H7099052H)

	Mode	Period	Video signal	Audio signal
1	SP	10 minutes	Stair step	7kHz
2		5 minutes	—	3kHz
3		10 minutes	Color bar	1kHz
4		3 minutes	RF sweep	—

2-1-5. Input/Output Levels and Impedance

Video input: LINE IN
(phono jack) (1)
Input signal: 1Vp-p, 75ohms, unbalanced, sync negative

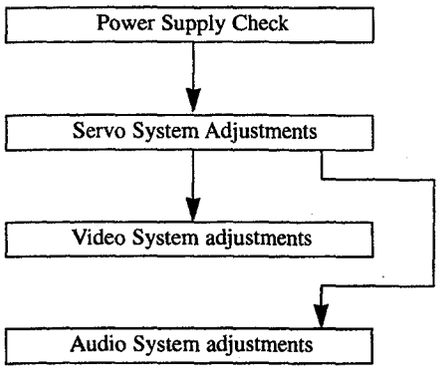
Video output: LINE OUT
(phono jack) (1)
Output signal: 1Vp-p, 75ohms, unbalanced, sync negative

Audio input: LINE IN
(phono jack) (1)
Input level: -7.5 dBs
(0dBs=0.775Vrms)
Input impedance: more than 47 kilohms

Audio output: LINE OUT
(phono jack) (1)
Standard level: -7.5dBs at load impedance 47 kilohms
Output impedance: less than 10 kilohms

2-1-6. Adjustment Sequence

The adjustments should be performed in the following sequence.



2-2. POWER SUPPLY CHECK

2-2-1. Output Voltage Check (MA-249 Board)

Mode	E-E
Measuring Instrument	Digital voltmeter
SW 12V Check	
Measurement point	IC141 pin ②
Specified value	12.0 ± 0.3V
MTR12V Check	
Measurement point	D131 cathode
Specified value	12.4 ± 0.5V
SW5V Check	
Measurement point	Q161 emitter
Specified value	5.1 ± 0.2Vdc
D5V Check	
Measurement point	D505 cathode
Specified value	5.1 ± 0.2V

[Check Method]

1) Each of these supply voltages must meet its specified value.

2-3. SERVO SYSTEM CHECK

Unless otherwise specified, set the switches to the following positions.

- CHANNEL Switch .....LINE
- TAPE SPEED Switch .....SP

2-3-1. RF Switching Position Check (MA-249, RP-196 Boards)

[Adjustment Purpose]

To check the link of the A-ch and B-ch of the tape playback outputs.

To make the unit compatible with other tapes and units. If this specification is not satisfied, the link will appear on the screen and the screen will be disrupted, etc.

Mode	Playback
Signal	Alignment tape: SP color bar portion
Measurement point	CH1: Video LINE OUT terminal CH2: CN002 pin ③ (RF SWP) (RP-196 board)
Measuring instrument	Oscilloscope
Specified value	6.5 ± 0.5H (416 ± 32 μSEC)

[Check Method]

1) Set TRACKING switch to MANUAL. ("Auto tracking" display will disappear on the display window indicator.)
2) Press the tracking buttons ▼ and ▲ and adjust the tracking position to the center.
3) Confirm the specified value 416 ± 32μSEC (6.5±0.5H)

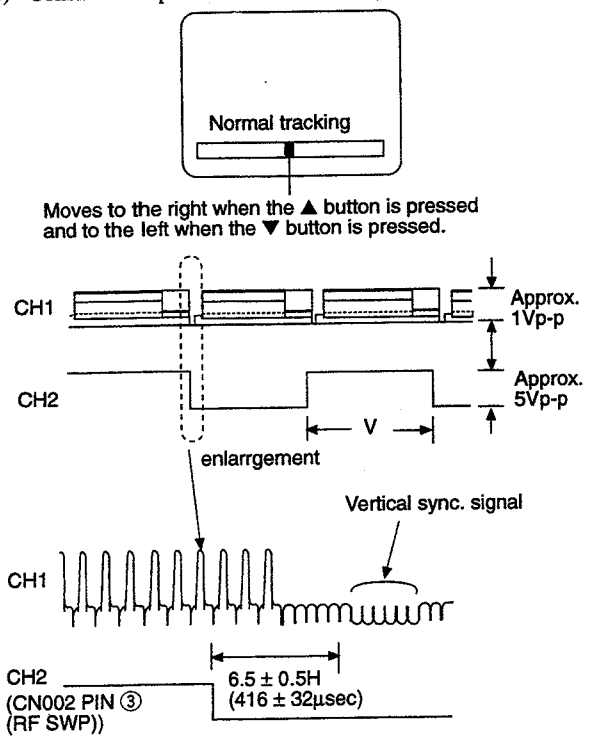


Fig. 7-2-3.

2-4. VIDEO SYSTEM CHECKS

For the video system checks, follow the checking procedures given below as a rule. The color bar video signal supplied from the pattern generator is used as the video input signal for the video system adjustment of the recording mode. Check that the signal satisfies the specified value designated in the "Check of input signal" (Fig. 7-2-2)

Unless otherwise specified, set the switches to the following positions.

- CHANNEL Switch .....LINE
- TAPE SPEED Switch .....SP

[Checking Sequence]

1) X'tal OSC Check
2) SYNC AGC Check
3) White clip/Dark clip Check
4) Recording Y Level Check
5) Recording Chroma Level Check
6) Playback Level Check

2-4-1. X'tal OSC Check (MA-249 Board)

Mode	Playback
Signal	Alignment tape: SP Color bar portion
Measurement point	IC201 pin ㉓
Measuring instrument	Oscilloscope and Frequency counter
Specified value	4,433,619 ± 90Hz

Note: A frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Check Method]

1) Check that the oscillation frequency satisfies the specified value and that the oscillation voltage is 450 ± 200mVp-p.

4,433,619 ± 90Hz

Fig. 7-2-4.

2-4-2. SYNC AGC Check (MA-249 Board)

Mode	E-E
Signal	Color bar
Measurement point	Video LINE OUT terminal
Measuring instrument	Oscilloscope
Specified value	A=1.00 ± 0.05Vp-p

[Check Method]

1) Check that the SYNC AGC level (A) satisfies the specified value.

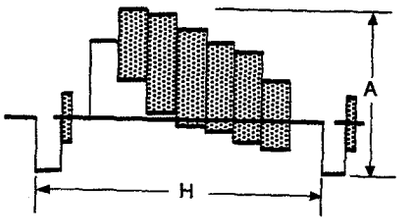


Fig. 7-2-5.

2-4-3. White Clip/Dark Clip Check (MA-249 Board)

Mode	E-E
Signal	Color bar
Measurement point	IC201 pin ㉜
Measuring instrument	Oscilloscope
Specified value	White clip: 190 ± 15% Dark clip: 52 ± 10%

[Check Method]

1) Check that the white clip level is 190 ± 15% to the white (100%) level.
2) Check that the dark chip level is 55 ± 10% to the white (100%) level.

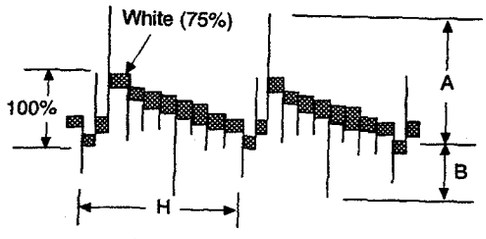


Fig. 7-2-6.

2-4-4. Recording Y Level Check (MA-249 Board)

Mode	E-E
Signal	No-signal
Measurement point	Q214 Emitter
Measuring instrument	Oscilloscope
Specified value	A=550 ± 150mVp-p

[Check Method]

1) Check that the recording RF signal satisfies the specified value.

Fig. 7-2-7.

2-4-5. Recording Chroma Level Check (MA-249 Board)

Mode	Recording
Signal	Color bar
Measurement point	IC201 pin ㉚
Measuring instrument	Oscilloscope
Specified value	A=160±28mV

[Check Method]

1) Confirm the amplitude of recording chroma level becomes the specified value.

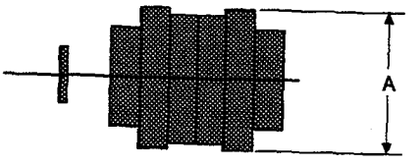


Fig. 7-2-8.

2-4-6. Playback Level Check (MA-249 Board)

Mode	Playback
Signal	Alignment tape: SP mode color bar portion
Measurement point	Video LINE OUT terminal
Measuring instrument	Oscilloscope
Specified value	A=1.00±0.02Vp-p

[Check Method]

1) Check that the playback level satisfies the specified value.

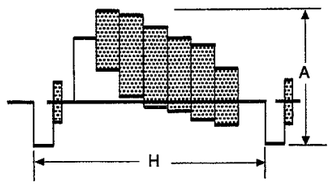


Fig. 7-2-9.

2-5. AUDIO SYSTEM ADJUSTMENT

[Connecting Instruments]

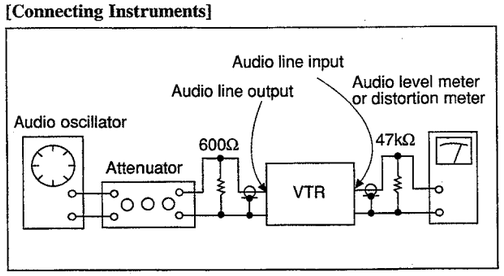


Fig. 7-2-10.

- Adjust in the SP mode if there is no special indications.
- Perform the adjustment setting the switch on the following positions.

CHANNEL Switch .....LINE

[Adjustment Method]

1. ACE head adjustment.....Refer to the VHS mechanical adjustment manual Ⅳ.
2. E-E output level check
3. Overall Output level and distortion factor check
4. Overall noise level check.

2-5-1. ACE Head Adjustment

Refer to the "VHS mechanical adjustment manual Ⅳ" (9-973-623-11).

2-5-2. E-E Output Level Check

Mode	E-E
Signal	400Hz, -7.5dBs: Audio LINE IN
Measurement point	Audio LINE OUT terminal
Measuring instrument	Audio level meter
Specified value	-7.5 ± 3dBs

[Check Method]

1) Input signal of 400Hz and -7.5dBs to the audio input.
2) Check that the audio output level is -7.5 ± 3dBs.

2-5-3. Overall Output Level and Distortion Factor Check

Mode	Self-record playback
Signal	400Hz, -7.5dBs: Audio LINE IN
Measurement point	Audio LINE OUT terminal
Measuring instrument	Audio level meter and Distortion meter
Specified value	Playback Level: -7.5 ± 3dBs Distortion: 4.0% or less

[Check Method]

1) Input signal of 400Hz and -7.5dBs to the audio input.
2) Record signal.
3) Playback the recorded portion.
4) Check that the output level is -7.5 ± 3dBs.
5) Check that the distortion factor is 4.0% or less .

2-5-4.Overall Noise Level Check

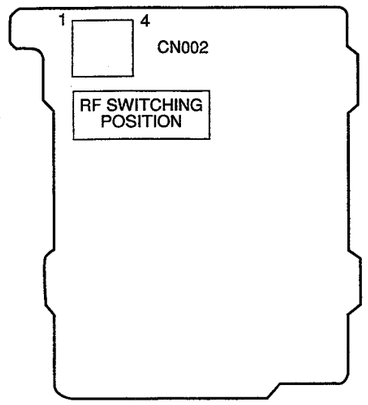
Mode	Self-record playback
Signal	No signal (Insert a shorting plug into the Audio LINE IN terminal)
Measurement point	Audio LINE OUT terminal
Measuring instrument	Audio level meter (IHF-A weighing filter is used)
Specified value	-46dBs or less

[Check Method]

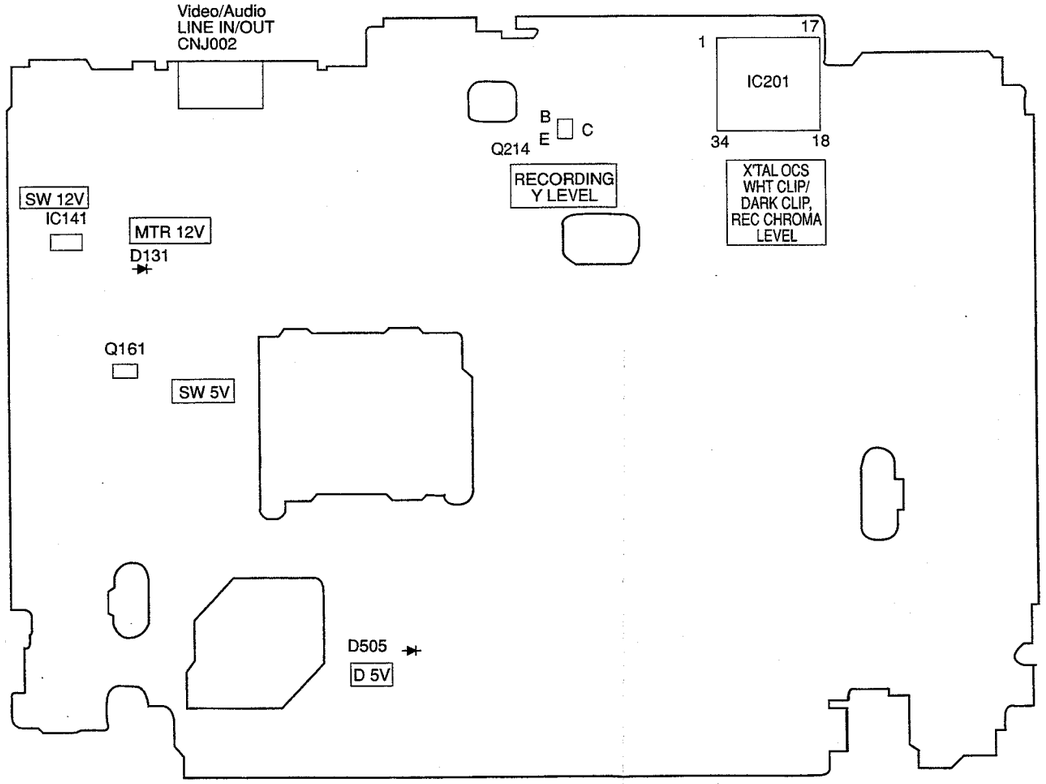
1) Record.
2) Playback recorded portion.
3) Check that noise level is -46dBs or less.

2-6. ADJUSTMENT PARTS LOCATION DIAGRAM

RP-196 BOARD (Conductor Side)



MA-249 BOARD (Conductor Side)



SLV-X315ME/X315PS/X315SG/X325AS/X325NZ/X325SA/X335AF/ X425ME/X425PS/X515ME/X515PS/X515SG/X525AS/X525NZ/X525SA

RMT-V181B/V181C/V181D/V181E/V181F/V181G

SONY

SERVICE MANUAL

ME Model
SLV-X315ME/X425ME/X515ME
PS Model
SLV-X315PS/X425PS/X515PS
SG Model
SLV-X315SG/X515SG
Australian Model
SLV-X325AS/X525AS
New Zealand Model
SLV-X325NZ/X525NZ
South African Model
SLV-X325SA/X525SA
African Model
SLV-X335AF

CORRECTION-1

Correct your service manual as shown below.

RF Switching Position Adjustment correct

(96-015)

As the adjustment method of the RF switching position was mistaked, please correct it.

Please refer to the next page for the correct adjustment method.

Page 7-3

2-3. SERVO SYSTEM. ADJUSTMENT

2-3-1. RF Switching Position Adjustment (MA, RP Boards)

[Adjustment Purpose]

To adjust the link of the A-ch and B-ch of the tape playback outputs.

To make the unit compatible with other tapes and units. If this specification is not satisfied, the link will appear on the screen and the screen will be disrupted, etc.

Mode	Playback
Signal	Alignment tape: SP color bar portion
Measurement point (Fig.A)	CH1: Video LINE OUT terminal CH2: CN002 pin ③ (RF SWP) (RP board)
Measuring instrument	Oscilloscope
Specified value	6.5 ± 0.5H (416 ± 32 µsec)

[Adjustment Method]

1) Short-circuit the ADJ-MODE land on MA board for about 1 second to activate the RF switching position adjustment mode. (Fig. C)
2) Check that "ADJUST" is indicated on FL display.
3) Using the channel + and – buttons, adjust to 416±32µsec (6.5±0.5H).
4) Press the PAUSE button.
5) Press the EJECT button.

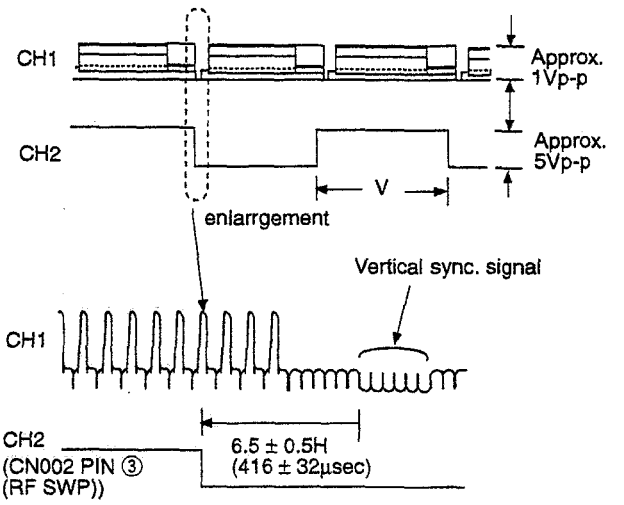


Fig. 7-2-3

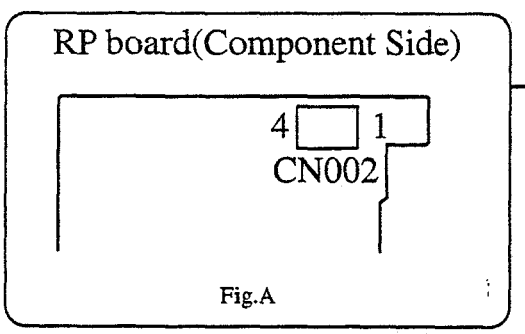


Fig.A

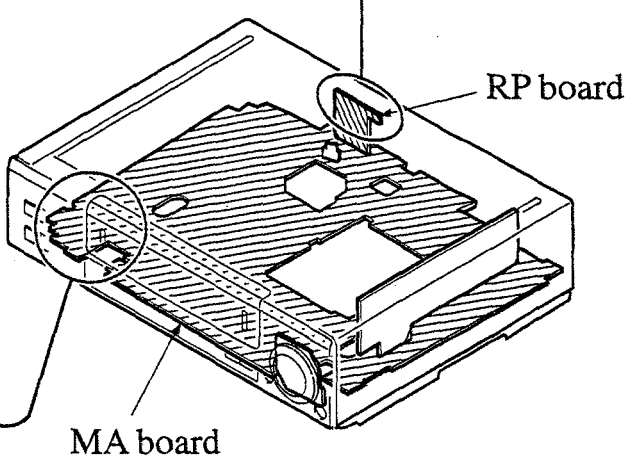


Fig.B

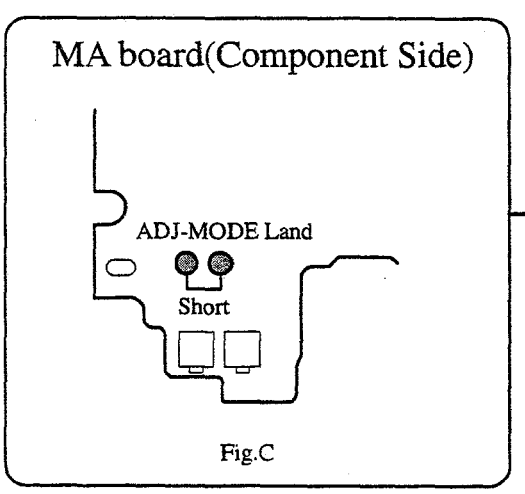


Fig.C

English
96D1616-1
Printed in Japan
© 1996.4
Published by Quality Engineering Dept.
(Osaki East)

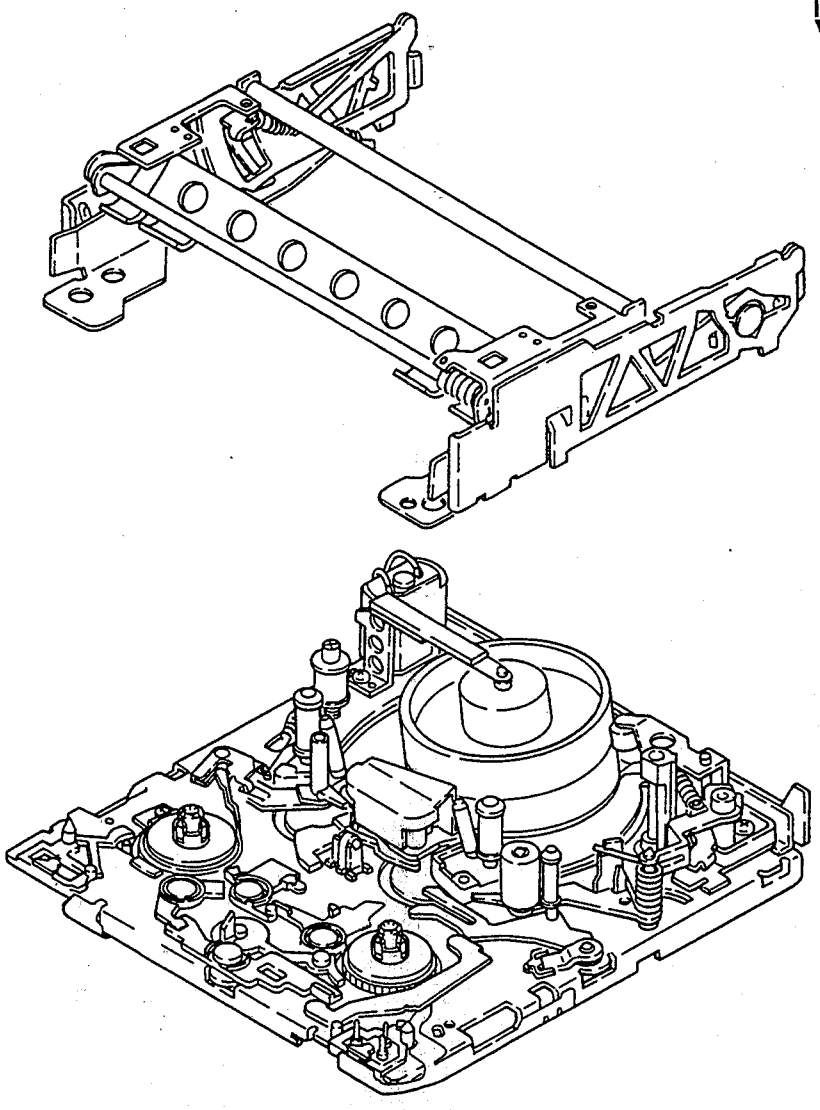
8mm Video MECHANICAL ADJUSTMENT MANUAL III

U MECHANISM

Video 8

Please use in conjunction with the SERVICE MANUAL.

V01571



8 MECHANISM DECK

SONY®

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1. PREPARATIONS FOR MECHANICAL BLOCK CHECK, ADJUSTMENT AND REPLACEMENT

Note: For removal of the cabinet, the boards, the cassette compartment, etc., refer to the service guides.

1-1. OPERATION WITHOUT CASSETTE COMPARTMENT ASSEMBLY AND TAPE

Note: The unit will not work if exposed to a strong light.

1-1-1. How to Trigger the Loading Operation (See Fig. 1-1.)

1) Supply power to the unit after removing the cabinet, the camera block, the cassette compartment assembly, etc., as indicated in the service guides. (This will enable operation of the mechanical deck.)
2) Cover the LED assembly with an opaque cap, etc. ❶.
3) Attach a piece of tape to the RECOG switch ❷ so that the pin is held down.
4) Push the EJECT lever ❸ in the direction of the arrow Ⓐ.

1-1-2. Setting the Playback Mode (See Fig. 1-1.)

1) Follow the procedures in section 1-1-1. above.
2) Put the rubber band ❹ around the S and T reels.
3) Press the PLAY switch of unit, then push the tension regulator arm assembly ❺ in the direction of the arrow Ⓑ when the T reel starts to rotate (the tension regulator band will be released, and the S reel will start rotating).
4) To stop operation, press the STOP switch.

1-1-3. Eject Operation (See Fig. 1-1.)

1) To eject, turn the EJECT switch on.

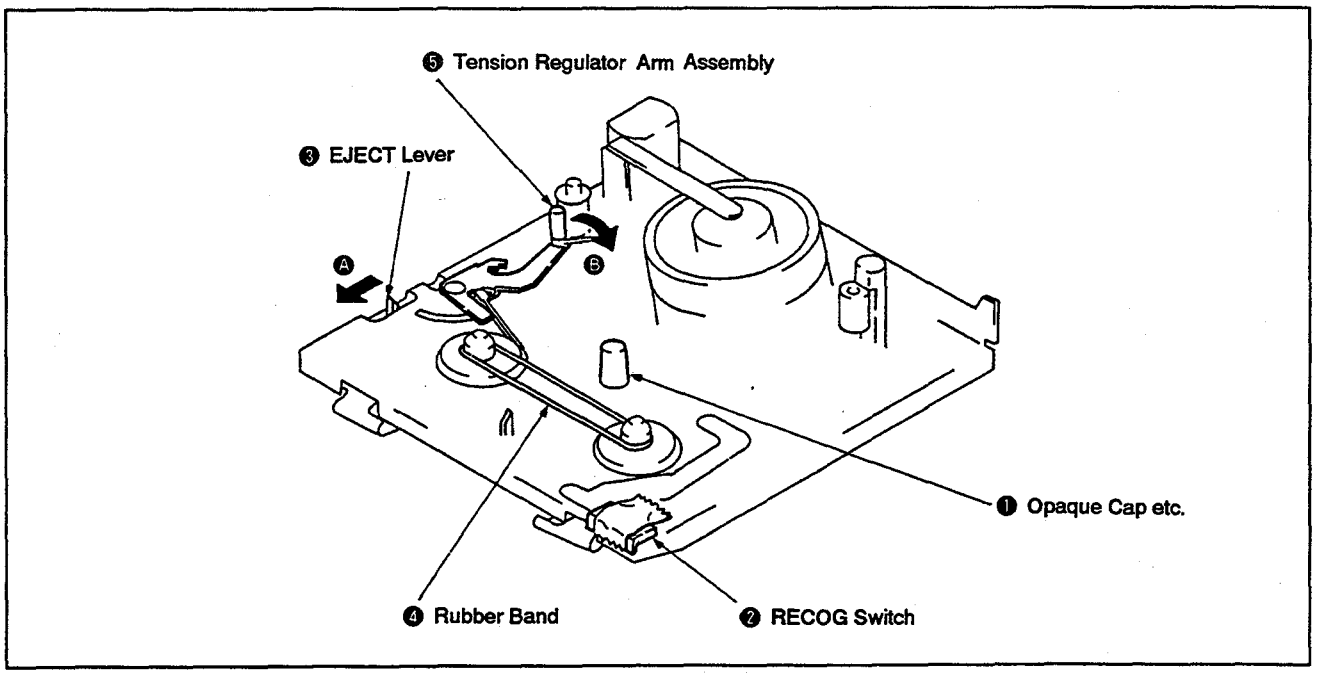


Fig. 1-1.

1-2. THE MODE SELECTOR

1-2-1. Name of Each Part (external) (See Fig. 1-2.)

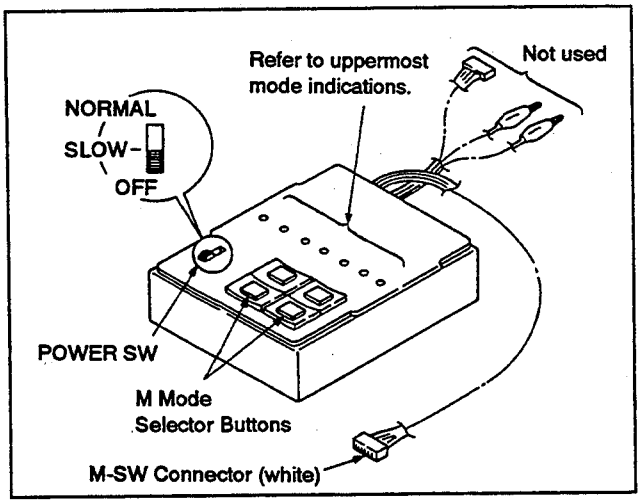


Fig. 1-2.

1-2-2. Connections (See Fig. 1-3.)

1) Mount the MODE SELECTOR III panel (Ref. No. J-9) ❶ onto the mode selector.
2) Attach the conversion connector (Ref. No. J-8) ❸ of MODE SELECTOR III to the 6-pin connector (white) ❷ of the mode selector M-SW.
3) Remove the FP-89 flexible board ❺ from the flexible connector ❹.
4) Attach the FP-89 flexible board ❺ to the flexible connector ❻ of the MODE SELECTOR III conversion connector ❸, then attach the 2-pin connector (white) ❽ of the loading motor to the 2-pin connector (white) ❼.

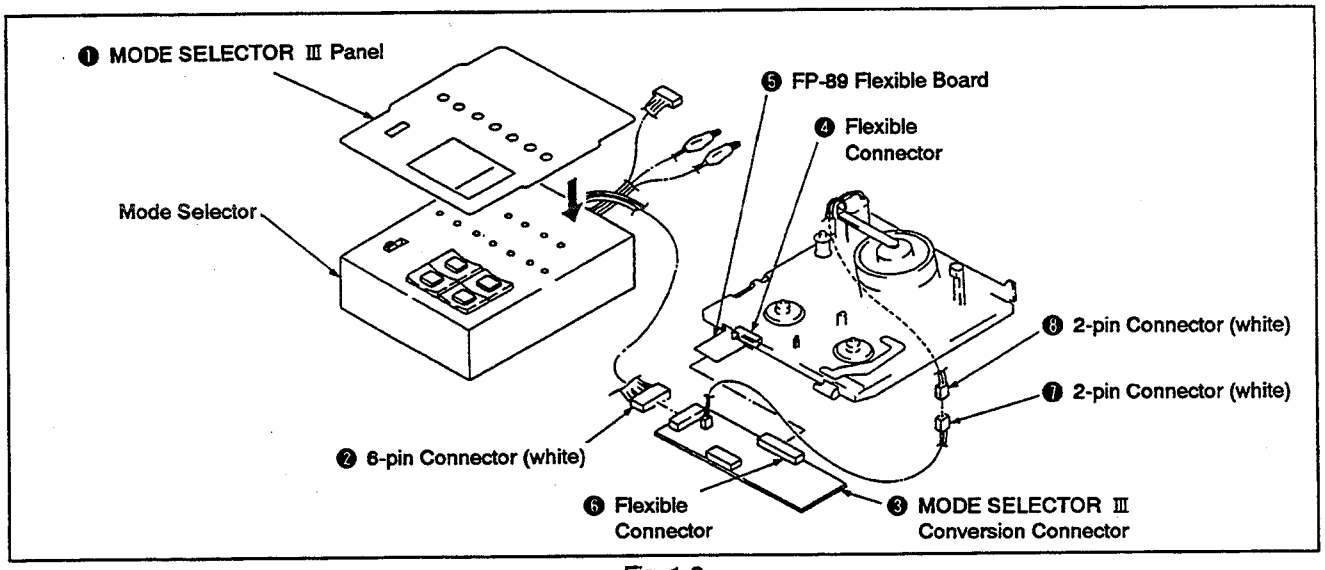


Fig. 1-3.

1-2-3. Handling (See Figs. 1-2. and 1-4.)

- Use only the M mode selector buttons.
- Refer to mode indications on the uppermost part of the MODE SELECTOR III panel.
- If the right M mode selector button is kept pressed, the lit indication will change in the order of EJECT → (IA) → ULD → (IB) → STOP → (IC) → FWD.
- To change modes in the reverse direction (from FWD to EJECT), press the left selector button.

Note: For this U mechanism, the uppermost indicators on the MODE SELECTOR III panel are used. The IA, IB and IC indications light up during mode changes.

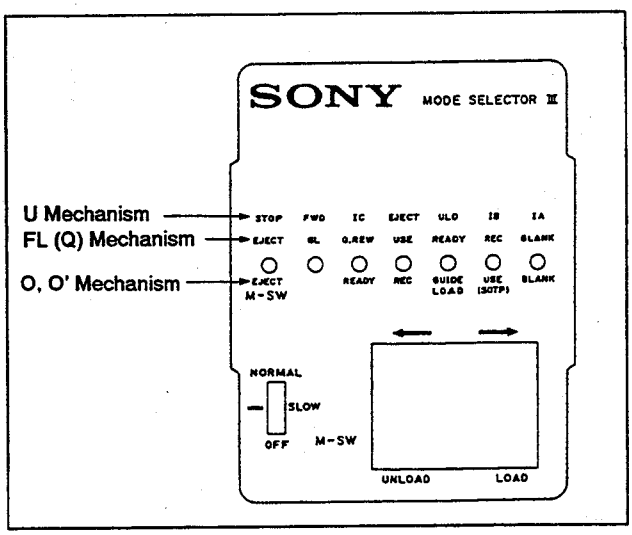


Fig. 1-4.

2. PERIODICAL CHECK AND MAINTENANCE (See Fig. 2-1.)

The following periodical check and maintenance procedures are necessary to ensure proper operation and to protect the tapes as well as the unit, and the following maintenance procedures must be always carried out after repairing regardless of how long the unit has been used.

2-1. ROTARY DRUM ASSEMBLY CLEANING

1) While pressing a piece of chamois leather (Ref. No. J-2) moistened in cleaning fluid (Ref. No. J-1) lightly against the rotary drum, turn the rotary upper drum slowly counter-clockwise with your fingers.

Note: Do not drive the drum with the motor, and do not turn it clockwise.
Do not move the chamois leather vertically against the head tip; this can damage the head tip. Strictly follow the cleaning instructions above.

2-2. TAPE PATH CLEANING

1) Set the cassette compartment assembly to the eject state, or remove it. Then clean the tape path (guides No. 1 to 7, capstan shaft, pinch rollers) with a piece of chamois leather moistened in cleaning fluid (See Fig. 2-1).

2-3. DRIVE SYSTEM CLEANING

1) Clean the drive system (timing belt, reel table surface) with a piece of cloth moistened in cleaning fluid.

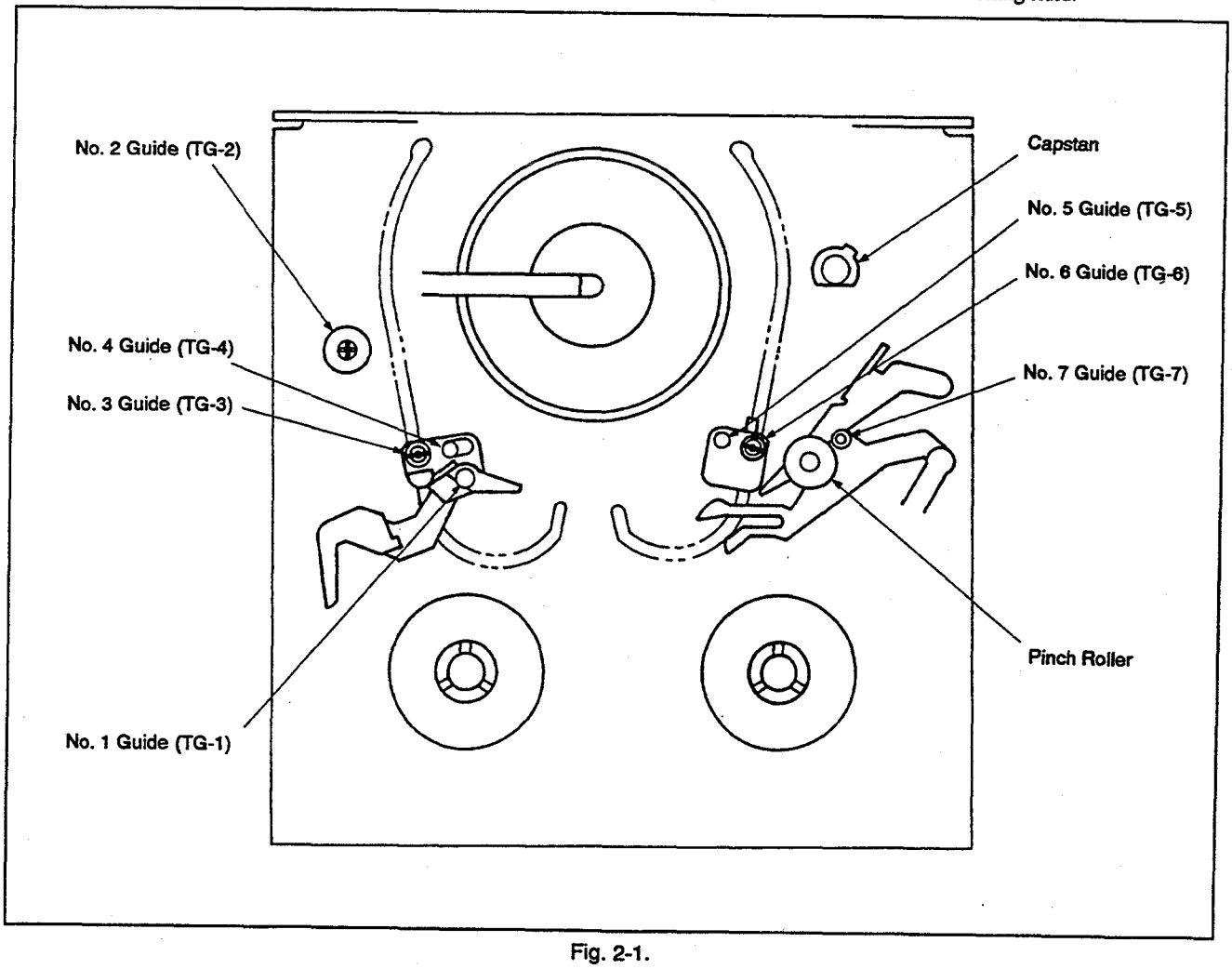


Fig. 2-1.

2-4. PERIODICAL CHECK ITEMS

○Cleaning ◎Lubrication ☆Check

Maintenance and Check Item		Operation time (H)										Remarks
		500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	
Cleaning and Demag-netizing	Tape path surfaces Cleaning	○	○	○	○	○	○	○	○	○	○	Do not oil.
	Rotary drum assembly cleaning and demagnetizing	○	○	○	○	○	○	○	○	○	○	Do not oil.
Drive System	Relay belt (short)	–	☆	–	☆	–	☆	–	☆	–	☆	3-728-866-01
	Relay belt (long)	–	☆	–	☆	–	☆	–	☆	–	☆	3-728-865-01
	Capstan shaft	–	◎	–	◎	–	◎	–	◎	–	◎	Take care that no oil gets on tape path surfaces.
	Idler pulley axle	–	◎	–	◎	–	◎	–	◎	–	◎	
	Loading motor	–	☆	–	☆	–	☆	–	☆	–	☆	1-541-612-11
Perfor-mance Check	Abnormal noise	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	
	Back tension measurement	–	☆	–	☆	–	☆	–	☆	–	☆	
	Brake system	–	☆	–	☆	–	☆	–	☆	–	☆	
	FWD, RVS torque measurement	–	☆	–	☆	–	☆	–	☆	–	☆	

Notes: When overhauling the unit, perform parts replacement referring to the table above.

Regarding Oil:

- Always use the specified oil (using oil of different viscosity, etc. can cause troubles of several kinds).
  Specified oil: Part No. 7-661-018-01
  (Mitsubishi Diamond Oil Hydrofluid EP56)
- Be sure that no dirt is mixed in the oil to be used on axle bearings. Use of dirty oil can result in bearing wear and burning.
- By "one drop of oil" is meant the quantity of oil adhering to the end of a a 2mm-diameter rod as shown in Fig. 2-2.

On grease:

- Use the specified grease.
  Grease: Part No. 7-662-010-08
  (Sony grease SGL-701)

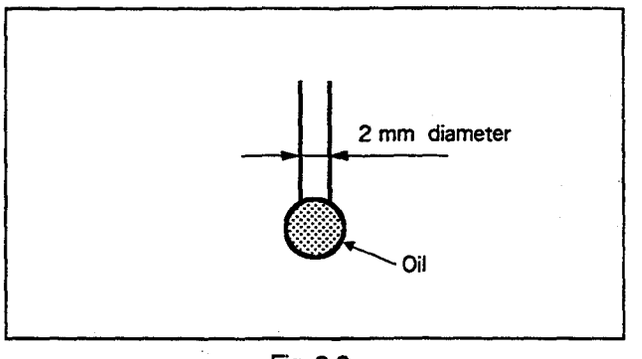
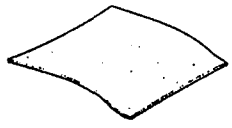
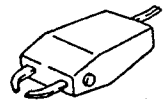
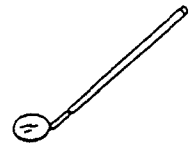
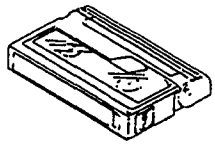
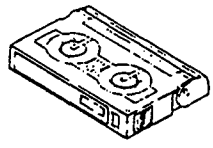
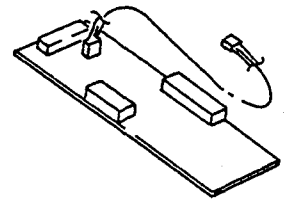
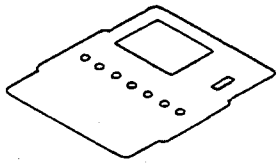
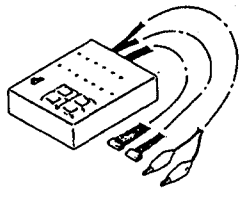
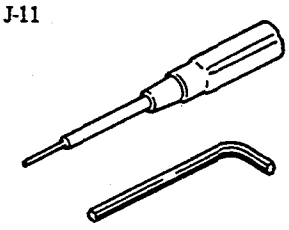
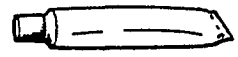


Fig. 2-2.

2-5. SERVICING TOOLS

Ref. No.	Name	Part Code	Marking	Application, etc.
J-1	Cleaning fluid	Y-2031-001-0	—	
J-2	Chamois cloth	2-034-697-00	—	
J-3	Head demagnetizer	Commercially available	—	
J-4	Dental mirror Spare mirror	J-6080-029-A J-6080-030-1	SL-5052	Tape path
J-5	Alignment tape NTSC (WR5-1N) PAL (WR5-1C)	8-967-995-01 8-967-995-06		Tape path
J-6	FWD/RVS takeup torque cassette	J-6080-824-A	GD-2086	
J-7	Rotary drum jig	(Attached to the maintenance rotary upper drum)		
J-8	Mode selector III conversion connector	J-6082-021-A		General
J-9	Mode selector III panel	J-6082-023-A		General
J-10	Mode selector	J-6080-825-A		General
J-11	Hexagonal wrench detection (0.89 mm) or L wrench (0.89 mm)	7-700-766-01 7-700-736-06		Tape path
J-12	Sony grease (SGL-701)	7-662-010-08		

Other devices: Oscilloscope
Analog tester (20 kΩ)

J-1	J-2 	J-3 	J-4 
J-5 	J-6 	J-7 (Attached to the maintenance rotary upper drum)	J-8 
J-9 	J-10 	J-11 	J-12 

3. MECHANICAL BLOCK CHECK, ADJUSTMENT AND REPLACEMENT

Notes:
- Use the mode selector (Ref. No. J-10) for procedures in this chapter.
- Modes within a frame [ ] are those set by pressing the buttons of the mode selector.

3-1. HC ROLLER ASSEMBLY

1. Removal (See Fig. 3-1.)

1) Remove the screw ❶, then remove the HC roller assembly ❷.

2. Installation (See Fig. 3-1.)

1) Align the two dowels ❸ attached to the HC roller assembly ❷ with the two holes ❹ in the mechanism chassis.
2) Secure the HC roller assembly ❷ with the screw ❶.

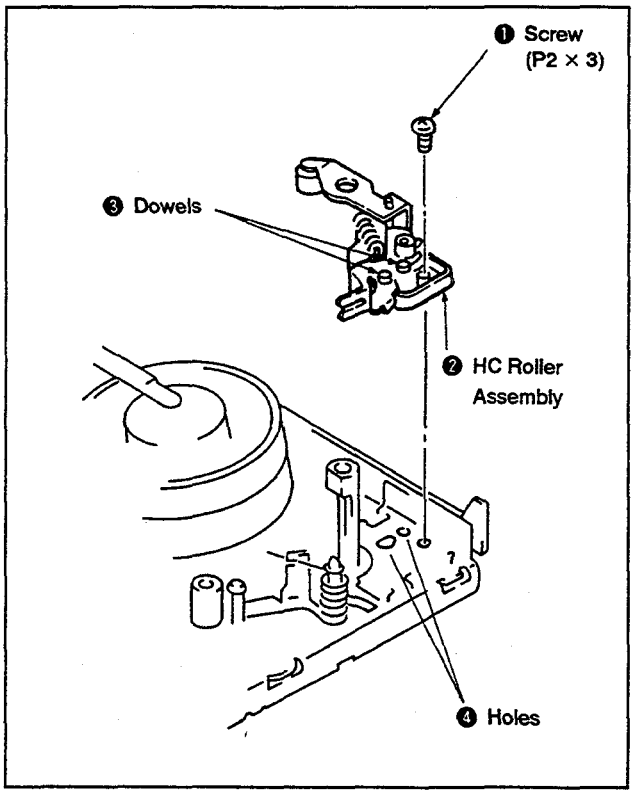


Fig. 3-1.

3-2. GUIDE GUARD ASSEMBLY

1. Removal (See Fig. 3-2.)

Remove the screw ❶, then remove the guide guard assembly ❷.

2. Installation (See Fig. 3-2.)

1) Align the dowel ❸ attached to the guide guard assembly ❷ with the hole ❹.
2) Secure the guide guard assembly ❷ with the screw ❶.

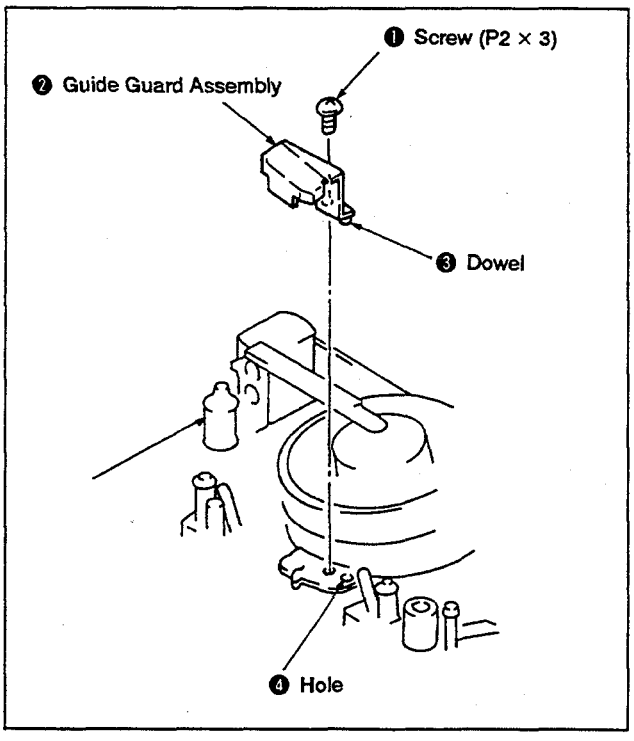


Fig. 3-2.

3-3. DC MOTOR (CAPSTAN MOTOR) ASSEMBLY

1. Removal (See Fig. 3-3.)

1) Set the ULD mode.
2) Turn the stopper ❶ in the direction of the arrow Ⓐ as far as it will go.
3) Remove the two screws ❷, then remove the DC motor ❸.

2. Installation (See Fig. 3-3.)

1) Align the two screwed dowels ❹ with the two holes ❺, then engage the toothed part ❻ with the connecting gear ❼.
2) Secure the DC motor assembly ❸ with the two screws ❷.
3) Turn the stopper ❶ in the direction of the arrow Ⓑ as far as it will go.

Note:
- When engaging the gears, take care not to damage their teeth.
- Do not leave any clearance between the DC motor ❸ and the chassis.
- Do not touch the capstan motor axle*, the oil seal* and the rotor*.

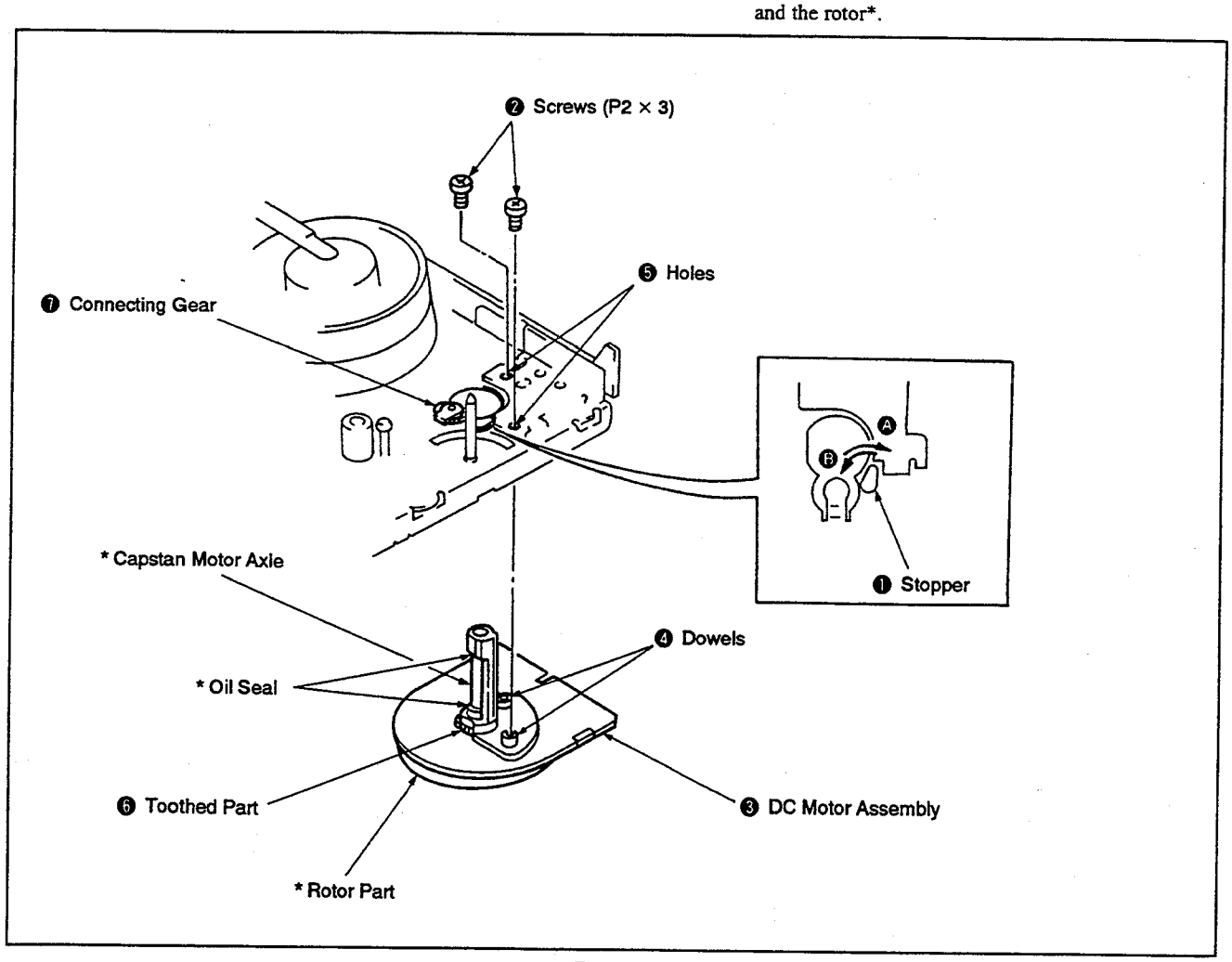


Fig. 3-3.

3-4. S BRAKE, T BRAKE

1. Removal (See Fig. 3-4.)

1) Remove the torsion coil spring (ST) ❶.
2) Remove the axle holding pin ❷, then remove the T brake ❸.
3) Remove the axle holding pin ❹, then remove the S brake ❺.

2. Installation (See Fig. 3-4.)

1) While fitting the toothed part ❻ into the notch ❼, mount the S brake ❺.
2) Insert the axle holding pin ❹.
3) Insert the axle ❽ to the S reel side of the brake release arm ❾ so that the Ⓐ part comes closer to the drum than part Ⓑ, and mount the T brake ❸.
4) Insert the axle holding pin ❷.
5) Insert the torsion coil spring (ST) ❶ below the claw ⓫ of the axle ⓾, then hook it to two claws ⓬.

Note: Confirm that the claws of axle holding pins ❷ and ❹ are not broken before assembling.

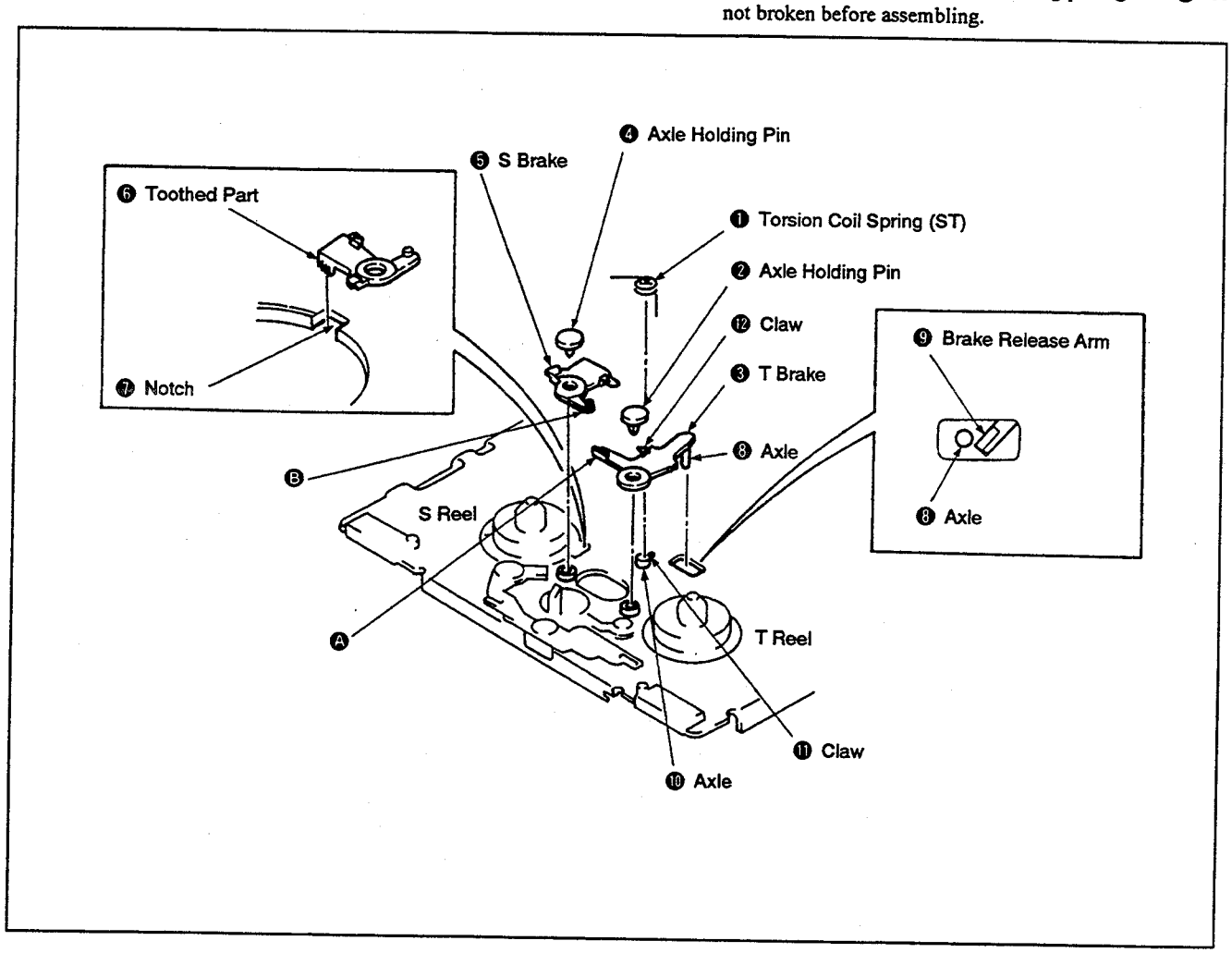


Fig. 3-4.

3-5. LB BRAKE, AXLE HOLDING PINS

1. Removal (See Fig. 3-5.)

1) Remove the screw ❶, then remove the TL holding plate ❷.
2) Remove the axle holding pin ❸, then remove the LB brake ❹.
3) Remove the axle holding pin ❺, then remove the LB lever ❻.

2. Installation (See Fig. 3-5.)

1) Mount the LB lever ❻ matching it to pin ❼ of the LB gear, then secure it with the axle holding pin ❺.
2) Insert the pin ❽ into the notch ❾ of the LB lever ❻, then mount the LB brake ❹ while inserting the toothed part ❿ into the notch ⓫.
3) Insert the axle holding pin ❸.
4) Align the dowel ⓬ with the hole ⓭, then mount the TL holding plate and secure it with the screw ❶.

Note: Confirm that the claws of axle holding pins ❸ and ❺ are not broken before assembling.

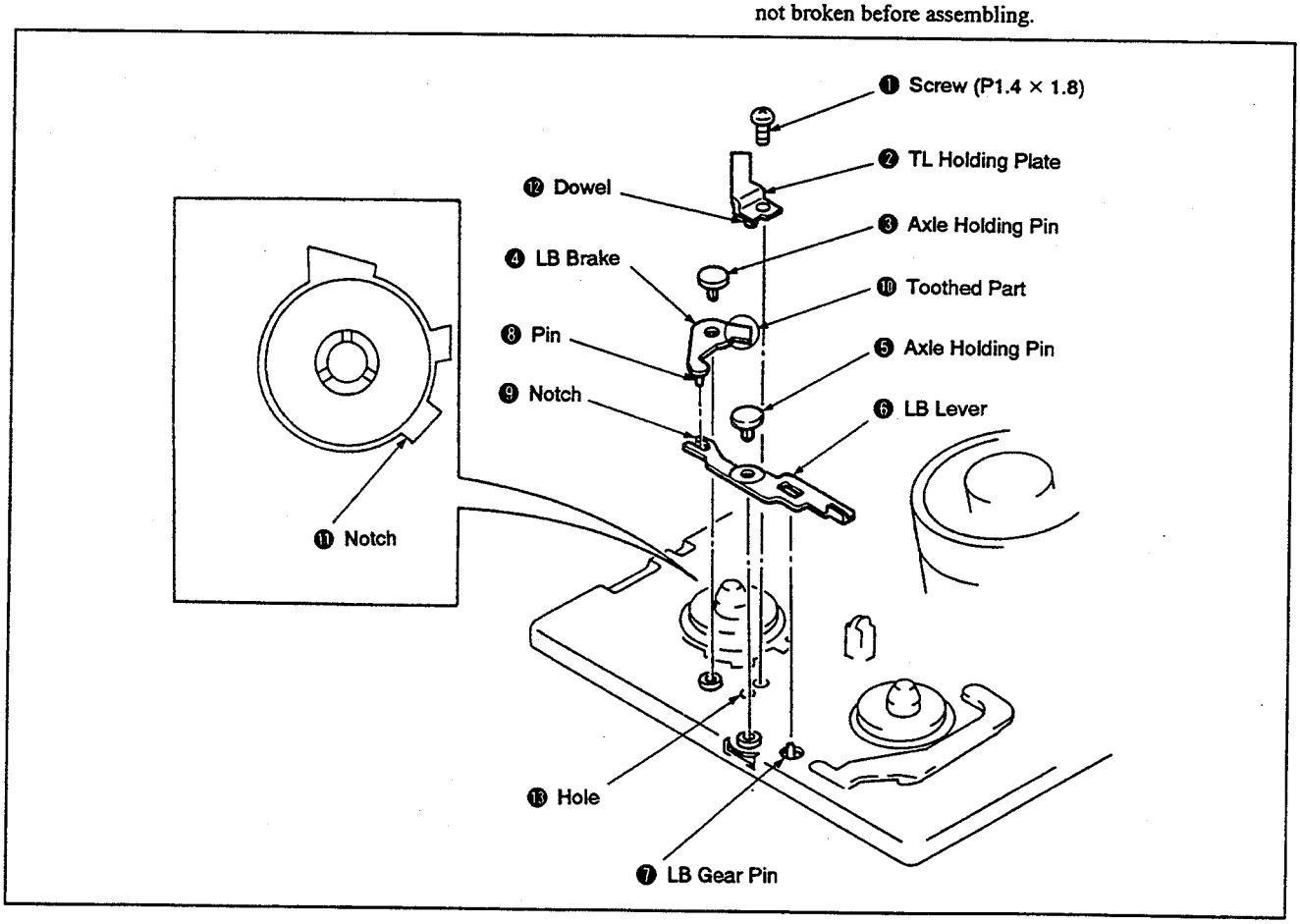


Fig. 3-5.

3-6. LB RELEASE ARM

1. Removal (See Fig. 3-6.)

1) While pushing the claw ❶ in the direction of the arrow, remove the LB release arm ❷.

2. Installation (See Fig. 3-6.)

1) Fit the LB release arm ❷ to the axle ❸, insert protrusions ⓐ, ⓑ, ⓒ, ⓓ into the three holes ❹, then secure with the claw ❶.

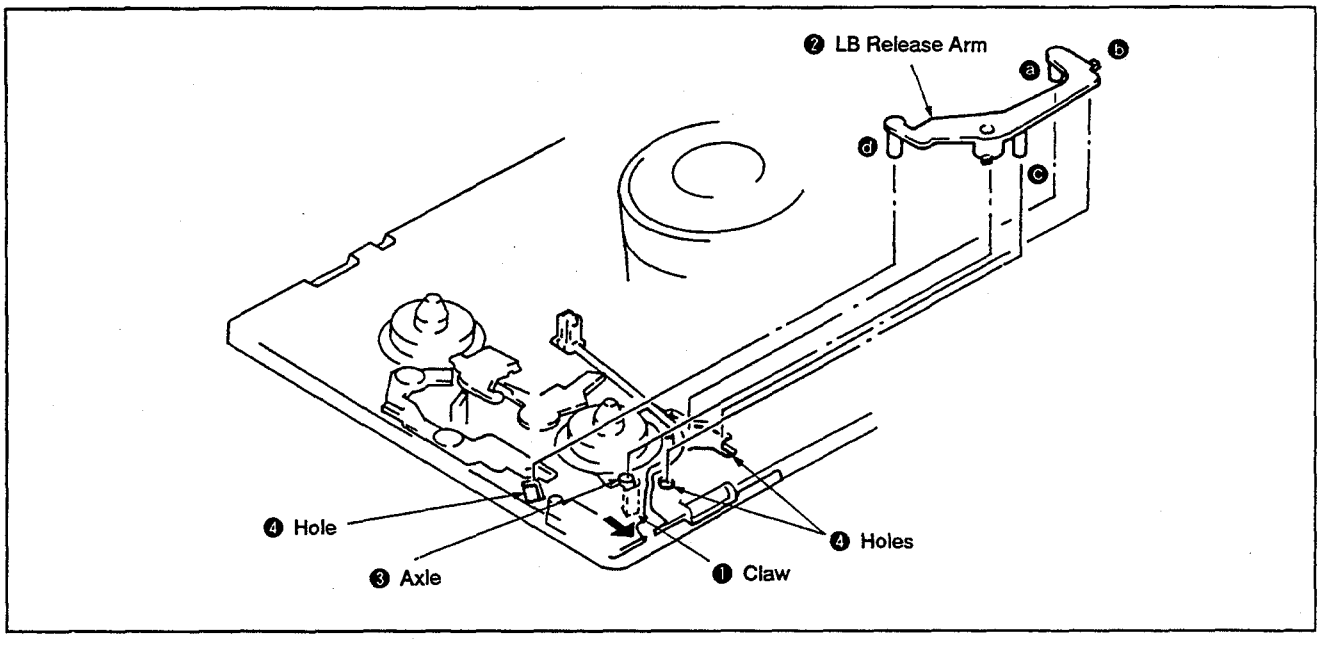


Fig. 3-6.

3-7. RK STOPPER, RK STOPPER ARMS

1. Removal (See Fig, 3-7.)

1) Remove the torsion coil spring (RK) ❶.
2) Open the chassis claw ❷, then remove the RK stopper arm ❸.
3) Remove the RK stopper ❹.

2. Installation (See Fig. 3-7.)

1) Mount the RK stopper ❹ onto the axle ❺.
2) Mount the RK stopper arm ❸ onto the axle ❺, insert Pin ❿ into hole ⓫, then hook the claw ❷ of the chassis to the hole ❼.
3) Insert the torsion coil spring (RK) ❶ into the axle ❺, then hook it to claws ❽ and ❾.

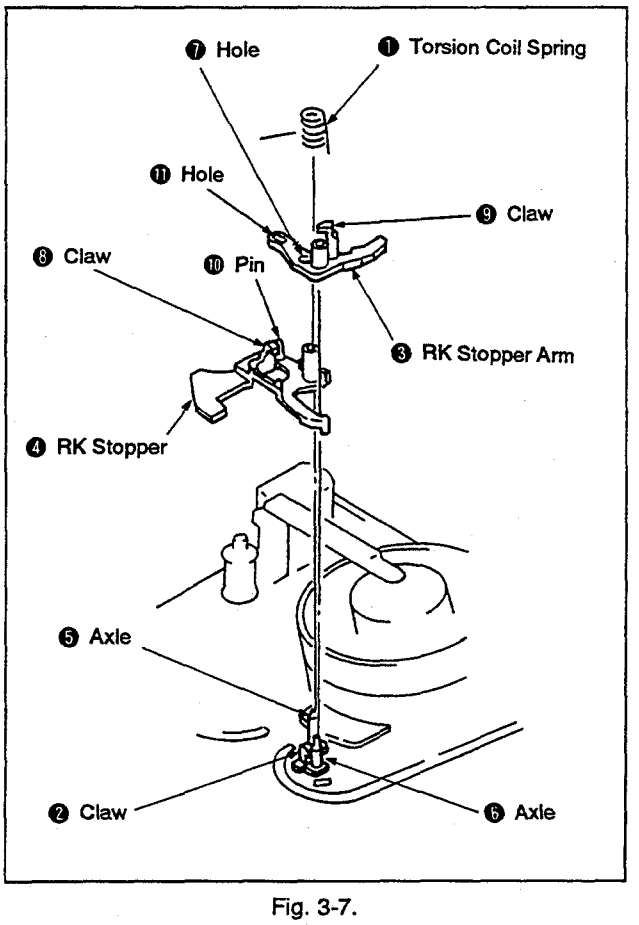


Fig. 3-7.

3-8. PINCH ARM ASSEMBLY, TG-7 ASSEMBLY

1. Removal (See Fig. 3-8.)

1) Set the [IB] mode.
2) Remove the stopper washer ❶, then remove the pinch arm assembly ❷.
3) Bend the claw ❹ inside hole ❸ in the direction of the arrow using a thin screwdriver or the like, then remove the TG-7 plate spring ❺.
4) Remove the TG-7 arm assembly ❻.

2. Installation (See Fig. 3-8.)

1) Grease the inner surfaces of hole ❼ (See Fig. A).
2) Insert the axle ❽ of the TG-7 arm assembly ❻ into the hole ❼.
3) Grease the shaded section ⓐ (See Fig. A).
4) Insert the TG-7 plate spring ❺ into the hole ❸, then secure it with the claw ❹.
5) Apply half a drop of oil to the axle ❾ (See Fig. B).
6) Fit the pinch arm assembly ❷ to the axle ❾ and insert the pinch roller sub arm assembly tab ❿ into the ⓑ part.
7) Install the stopper washer ❶.

Note:
- Take care not to grease the screw ⓫ of the TG-7 arm assembly ❻ (See Fig. A).
- When fitting the pinch arm assembly ❷ to the axle ❾, make sure that it does not touch the TG-7 guide ⓬ or the rubber roller ⓭.
- After assembling, be sure to perform tape path adjustment as described in section 4.

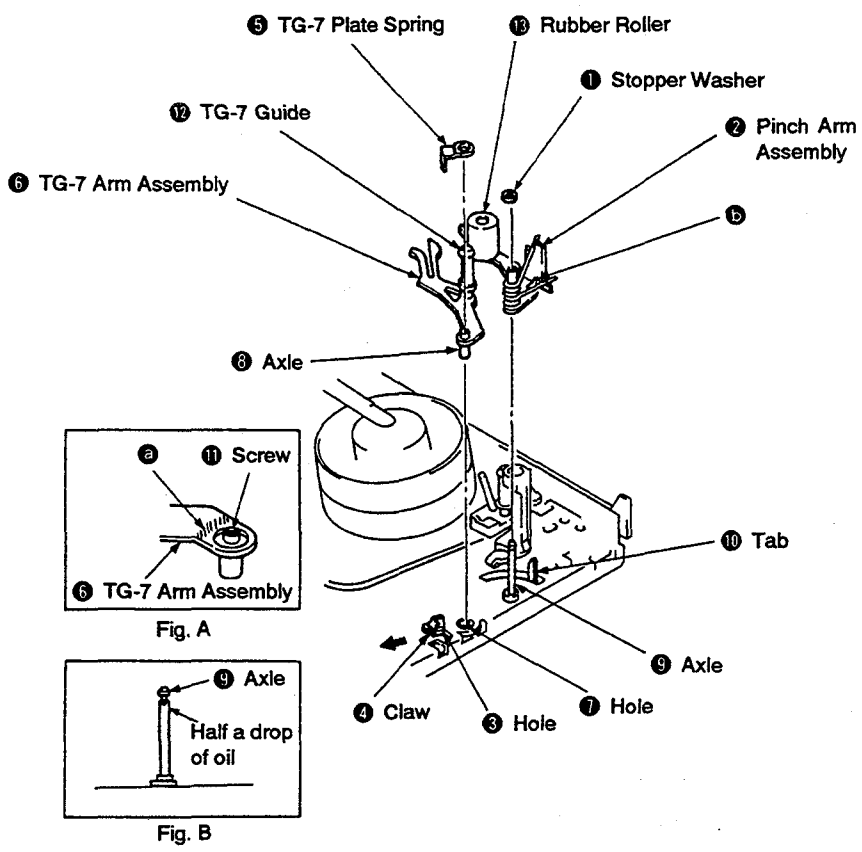


Fig. 3-8.

3-9. TG-2 ASSEMBLY

1. Removal (See Fig. 3-9.)

1) Remove the TG-2 upper flange assembly ❶.
2) Remove the TG-2 roller ❷, the TG-2 sleeve ❸, the TG-2 lower flange ❹ and the compression spring ❺.

2. Installation (See Fig. 3-9.)

1) Mount the compression spring ❺, the TG-2 lower flange ❹, the TG-2 sleeve ❸ and the TG-2 roller ❷ to the axle.
2) Secure the TG-2 upper flange ❶ to the axle by rotating it 4 to 6 turns.

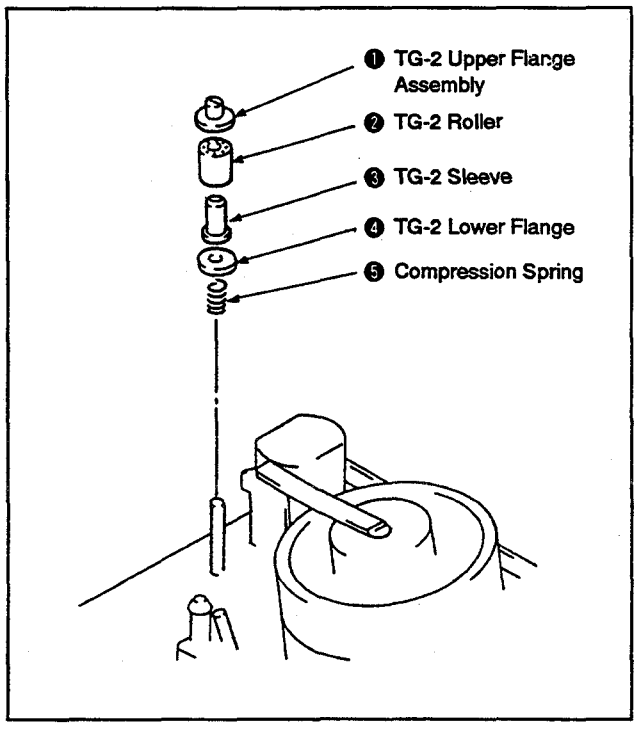


Fig. 3-9.

3. TG-2 Height Preset (see Fig. 3-10.)

1) Adjust height from the mechanism chassis upper surface to the TG-2 upper flange ❶ upper surface to 18.6 mm by turning the TG-2 upper flange ❶.

Note: After adjustment, be sure to perform tape path adjustment as described in section 4.

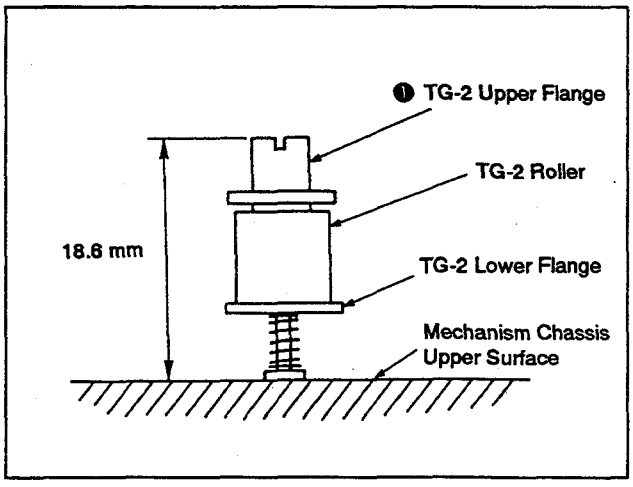


Fig. 3-10.

3-10. S REEL TABLE ASSEMBLY, T REEL TABLE ASSEMBLY

1. Removal (See Fig. 3-11.)

1) Remove the S brake and T brake as described in section 3-4.
2) Remove the TL holding plate as described in section 3-5.
3) Remove the tension regulator band assembly as described in section 3-11.
4) Remove the S reel table assembly ❶.
5) Turn the stopper ❷ approx. 90 ° in the direction of the arrow Ⓐ.
6) While sliding the LB release arm ❸ in the direction of the arrow Ⓑ, remove the T reel table assembly ❹.

2. Installation (See Fig. 3-11.)

1) Apply half a drop of oil to the axle ❺ (See Fig. A).
2) Move the RK gear ❻ in the direction of the arrow Ⓒ and the TS brake ❼ in the direction of the arrow Ⓓ, putting them out of the way.
3) While sliding the LB release arm ❸ in the direction of the arrow Ⓑ, mount the T reel table assembly ❹ onto the axle ❺, then turn the stopper ❷ in the direction of the arrow Ⓔ as far as it will go.
4) Apply half a drop of oil to the axle ❽ (See Fig. B).
5) Move the RK gear ❻ in the direction of the arrow Ⓕ, the UL brake ❾ in the direction of the arrow Ⓖ and the LB brake ❿ in the direction of the arrow Ⓗ, putting them out of the way.
6) Mount the S reel table ❶ onto the axle ❽.
7) Mount the tension regulator band assembly as described in section 3-11.
8) Mount the TL holding plate as described in section 3-5.
9) Mount the S brake and T brake assemblies as described in section 3-4.

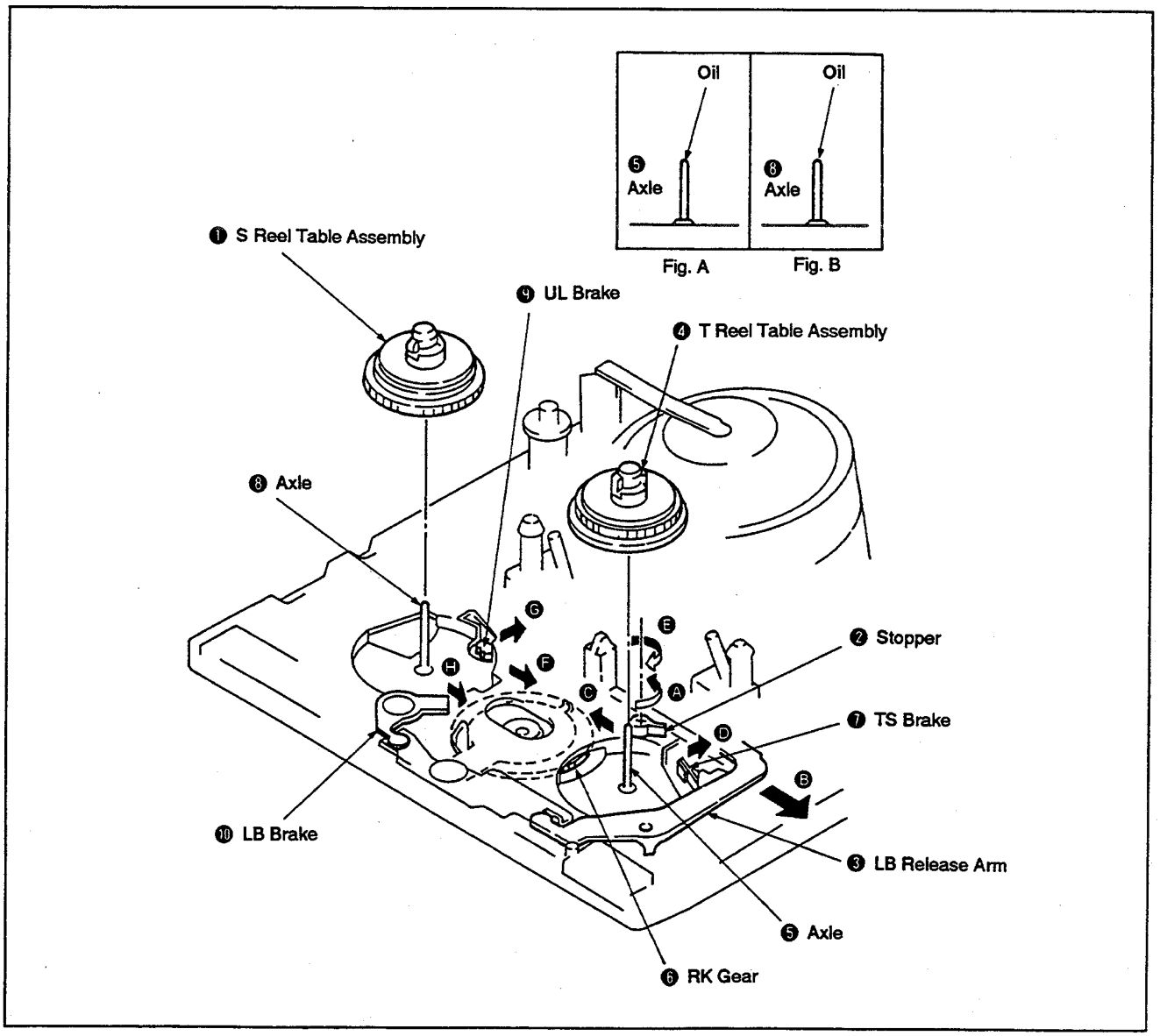


Fig. 3-11.

3-11. TENSION REGULATOR BAND ASSEMBLY, TENSION REGULATOR ARM ASSEMBLY

1. Removal (See Fig. 3-12.)

1) Remove the TL holding plate as described in section 3-5.
2) Remove the screw ❶.
3) Using a thin screwdriver or the like, remove the tension regulator band assembly ❹ from the axle ❸ of tension regulator arm assembly ❷.
4) Remove the tension spring ❺.
5) Remove the stopper washer ❻ from the back of the mechanism chassis, then remove the tension regulator arm assembly ❷.
6) Open the claw ❼, then remove the adjust arm ❽.

Note: When removing the tension regulator band assembly ❹, take care not to twist or bend it, and not to touch the felt surface ❾.

2. Installation (See Fig. 3-12.)

1) Engage the adjust arm ❽ in the position shown in Fig. A, then close the claw ❼.
2) Apply half a drop of oil to the hole ❿.
3) Mount the tension regulator arm assembly ❷, then insert it into the slot ⓫ so that the ⓐ part comes to the arrow Ⓐ side of the switch lever assembly (See Fig. B).
4) While holding the tension regulator arm assembly ❷ from the mechanism chassis front, secure it with the stopper washer ❻ from the back.
5) Hook the R hook of the tension spring ❺ to the adjust arm ❽ as shown in the figure, then hook the opposite end to the tension regulator arm assembly ❷.
6) Mount the tension regulator band assembly ❹ onto the axle ❸ of tension regulator arm assembly ❷, and place it so that the felt surface ❾ comes against the shaded portion of the S reel table assembly ⓬.
7) Mount the tension regulator plate ⓭ of the tension regulator band assembly ❹ so that it is aligned with the dowel ⓮ of the mechanism chassis, then secure it temporarily with the screw ❶.
8) Mount the TL holding plate as described in section 3-5.
9) Adjust tension regulator FWD position as described in section 3-12.
10) Perform adjust arm adjustment as described in section 3-22.

Note: When mounting the tension regulator band assembly ❷, take care not to twist or bend it, and not to touch the felt surface ❾.

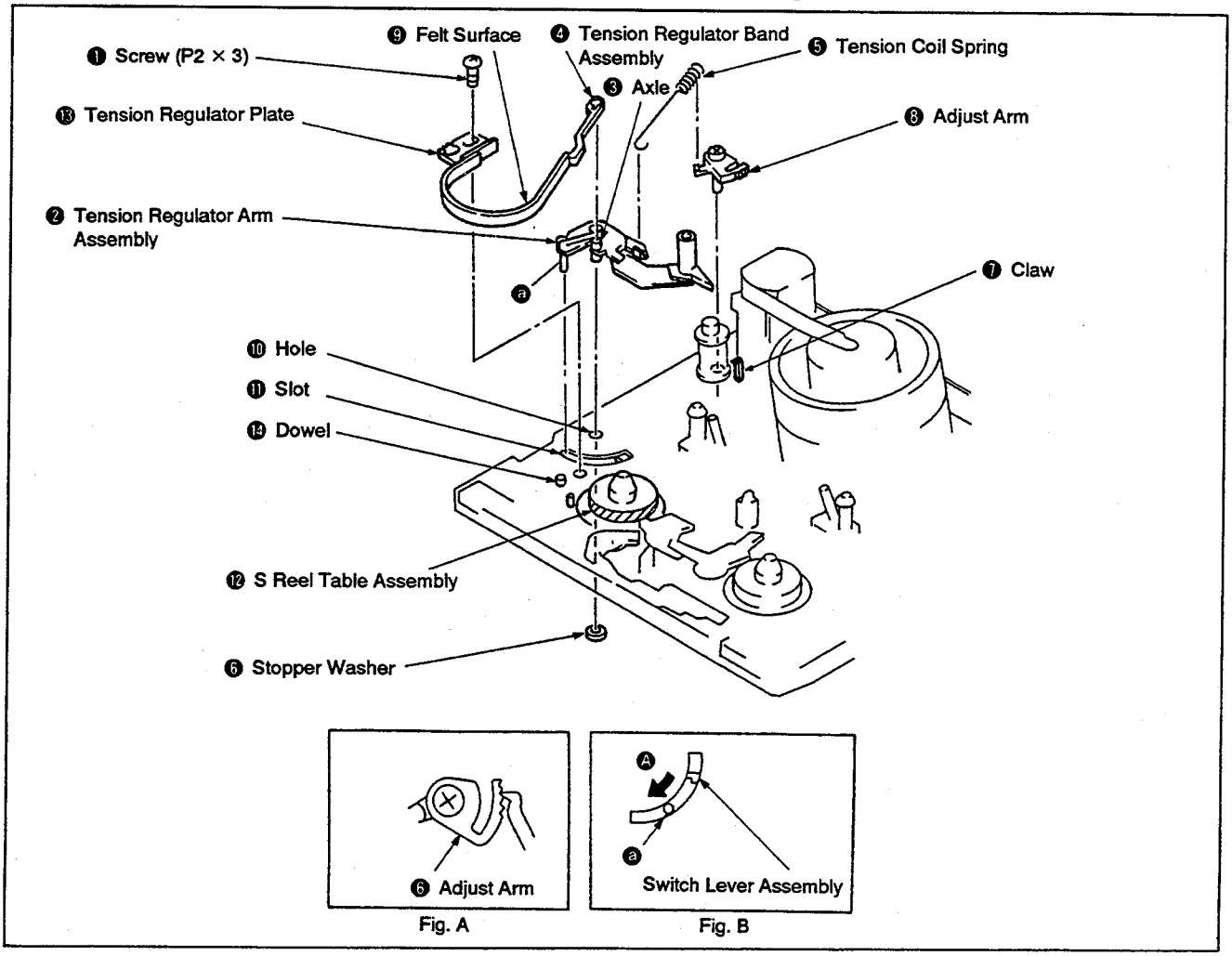


Fig. 3-12.

3-12. TENSION REGULATOR FWD POSITION PRESET (See Fig. 3-13.)

1) Load a cassette tape and set the FWD mode.
2) Confirm whether the distance between ⓐ part of the tension regulator arm ❶ and the groove ❷ of the chassis is 1.1 ± 0.3 mm. If this distance is not within the specified range, remove the cassette tape and perform the following adjustment.
3) Loosen the fixing screw ❹ of the tension regulator band assembly ❸.
4) Slide the tension regulator plate ❺ in the direction of the arrow Ⓐ if the measured distance is over the specified range, and in the direction of the arrow Ⓑ if it is under that range. Then, fix it with the screw ❹.
5) Repeat steps 1) and 2) and confirm that the distance is within the specified range.

Note: Use a cassette with the tape advanced halfway.

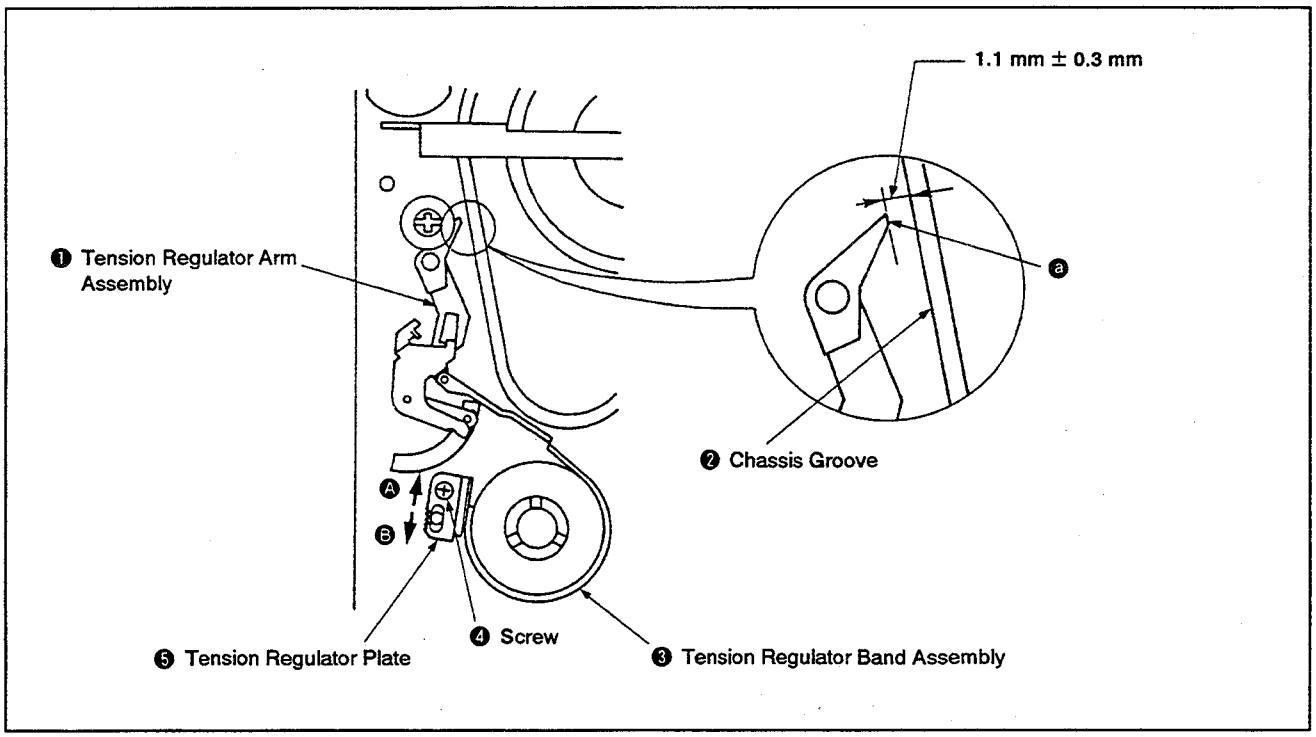


Fig. 3-13.

3-13. DRUM ASSEMBLY, DEW SENSOR

1. Removal (See Fig. 3-14.)

1) Set the EJECT mode.
2) Remove the flexible board ❶ and the two connectors ❷.
3) Remove the guide guard assembly as described in section 3-2.
4) Remove the screw ❸, then remove the axle ground terminal ❹.
5) Remove the three screws ❺, then remove the drum assembly ❻ from the mechanism chassis.
6) Remove the connector ❿
7) Remove the screw ❼, then remove the dew sensor ❽.

Note:
- When removing the drum assembly ❻ from the mechanism chassis, take care not to cut the flexible board ❶ or the harness.
- Take care not to touch the head tip ❾.

2. Installation (See Fig. 3-14.)

1) Insert part Ⓐ of the dew sensor ❽ into the notch ⓫ of the mechanism chassis, then secure it with the screw ❼.
2) Mount the connector ❿.
3) Clamp the harness ⓯ of the dew sensor ❽ with the reinforcing the claw ⓰ of the plate SS assembly (See Fig. A).
4) Insert the connector ❷ and the flexible board ❶ into the hole ⓬ of the mechanism chassis, align the drum assembly ❻ with the two dowels ⓭ and secure it with the three screws ❺.
5) Align the axle ground terminal ❹ with the two dowels ⓮ of the mechanism chassis and secure it with the screw ❸.
6) Mount the guide guard assembly as described in section 3-2.
7) Mount the two connectors ❷ and the flexible board ❶.

Note:
- Take care not to cut the flexible board ❶ or the harness ⓯.
- Take care not to touch the head tip ❾.
- After assembling, be sure to perform Tape Path Adjustment following instructions in section 4.

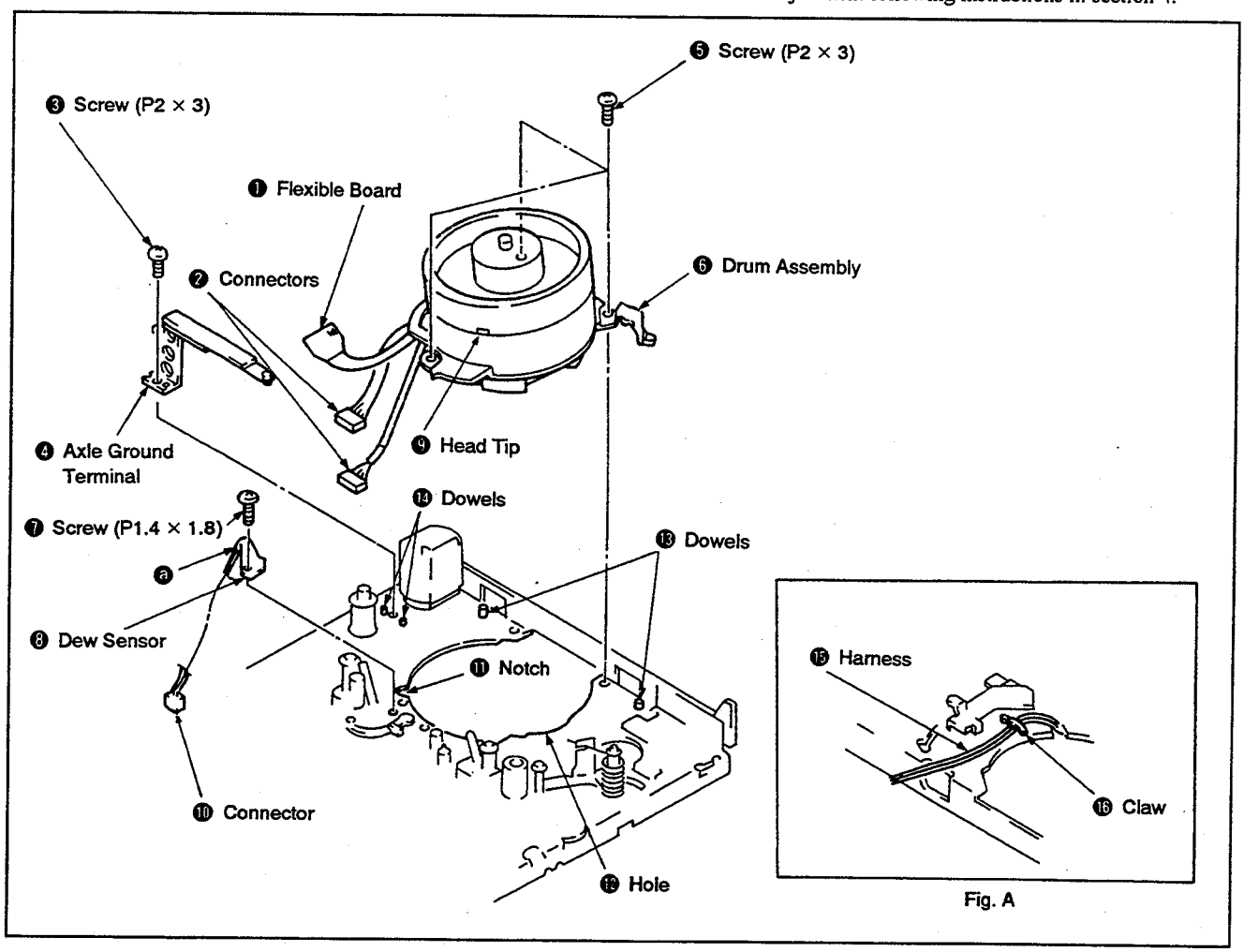


Fig. 3-14.

3-14. EJECT LEVER, SWITCH LEVER ASSEMBLY, PINCH ROLLER SUB ARM ASSEMBLY

1. Removal (See Fig. 3-15.)

1) Remove the DC motor (capstan motor) as described in section 3-3.
2) Set the STOP mode.
3) Remove the claw ❶, then remove the eject lever ❷.
4) Remove the stopper washer ❸, then remove the switch lever assembly ❹.
5) Remove the pinch roller load spring ❺.
6) Remove the stopper washer ❻, then remove the pinch roller sub arm assembly ❼.

2. Installation (See Fig. 3-15.)

1) Grease the axle ❽ (See Fig. A).
2) Assemble by inserting ⓓ part of the pinch roller sub arm assembly ❼ into the slot ❾, then insert the pin ❿ into the loading lever assembly notch ⓫.
3) Secure with the stopper washer ❻.
4) Mount the pinch roller load spring ❺ by catching its ⓑ end between the claw ⓬ and the chassis side and its ⓒ end to the claw ⓬.
5) Apply half a drop of oil to the axle ⓭ (See Fig. B).
6) Align the groove ⓮ of the switch lever assembly ❹ with the mode detector switch protrusion ⓯, mount it on the axle ⓭, then insert the pin ⓰ into the drive gear (left) assembly ⓱ outer groove.
7) Secure with the stopper washer ❸.
8) Mount the eject lever ❷ and close the claw ❶.
9) Mount the DC motor (capstan motor) as described in section 3-3.

Note: When mounting the switch lever assembly ❹ onto the axle ⓭ with the tension regulator arm assembly installed, set the pin ⓰ to the arrow Ⓐ side of the switch lever assembly ❹.

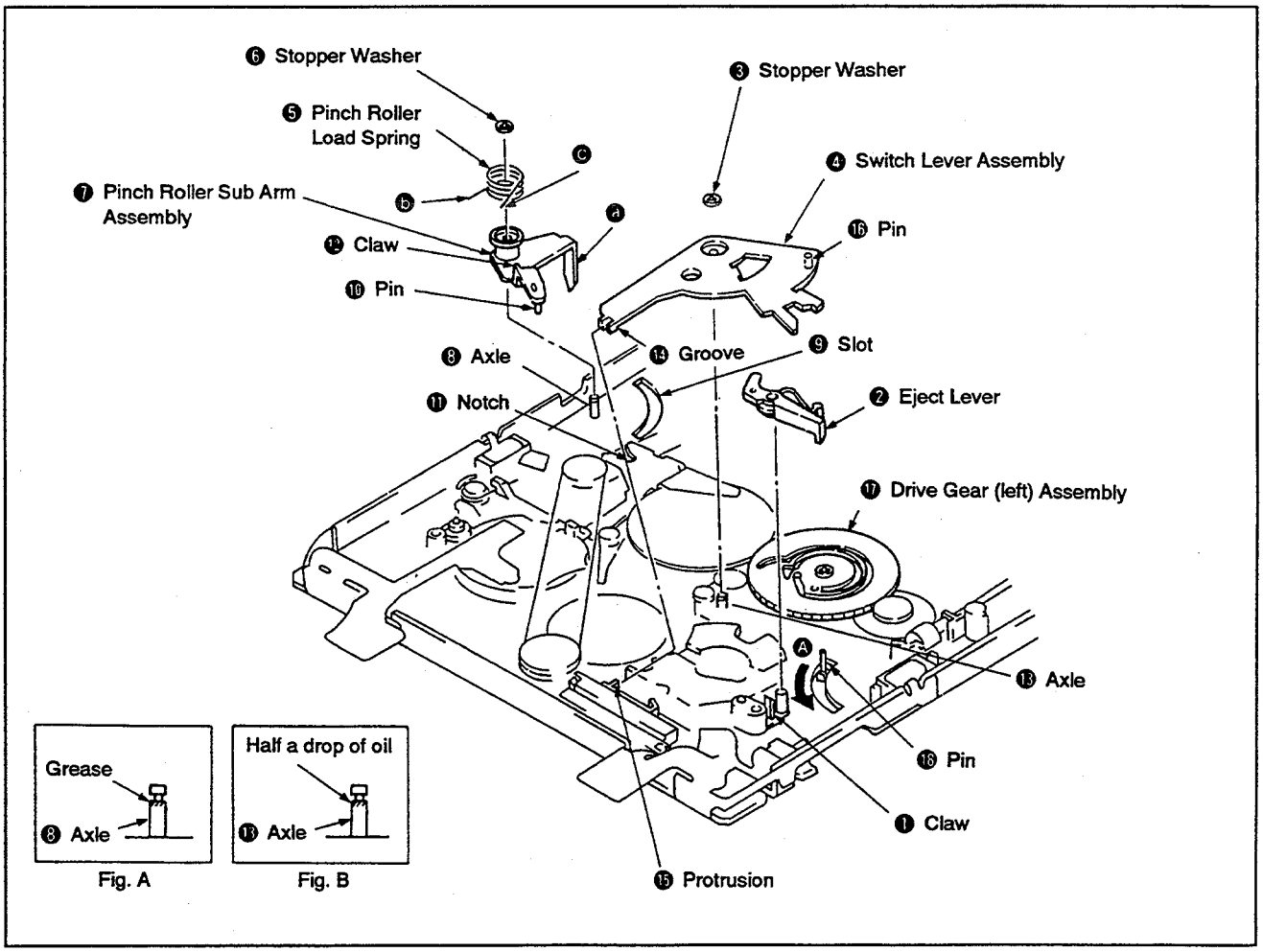


Fig. 3-15.

3-15. TIMING BELT (L) , RC GEAR ASSEMBLY, LOADING LEVER ASSEMBLY, TIMING BELT (S), CONNECTING GEAR ASSEMBLY

1. Removal (See Fig. 3-16.)

1) Remove the DC motor (capstan motor) as described in section 3-3.
2) Remove the pinch roller sub arm assembly as described in section 3-14.
3) Set the STOP mode.
4) Remove the stopper washer ❶ , then remove the RC gear assembly ❷ from the axle ❹ with the timing belt (L) ❸ attached.
5) Remove the timing belt (L) ❸ from the idler pulley assembly ❺ .
6) Remove the stopper washer ❻ and remove the loading lever assembly ❽ while pushing the claw ❼ in the direction of the arrow Ⓐ .
7) Turn the stopper ❾ approx. 90 ° in the direction of the arrow Ⓑ .
8) Remove the connecting gear assembly ⓫ from the axle ⓰ with the timing belt (S) ⓾ attached.
9) Remove the timing belt (S) ⓾ from the idler pulley assembly ❺ .

Note: When removing the connecting gear ⓫ , take care not touch the flange section ⓑ .

2. Installation (See Fig. 3-16.)

1) Apply half a drop of oil to the axle ⓰ (See Fig. F).
2) Hook one end of the timing belt (S) ⓾ onto the connecting gear assembly ⓫ and the other end onto gear ⓓ of the idler pulley assembly ❺ . (Refer to the figure.)
3) Mount the connecting gear assembly ⓫ with the timing belt (S) ⓾ attached to the axle ⓰ .
4) Turn the stopper ❾ in the direction of the arrow Ⓒ as far as it will go.
5) Apply half a drop of oil to the axle ⓬ (See Fig. A).
6) Fit the loading lever assembly ❽ to the axle ⓬ , secure the ⓐ part with the claw ❼ and place the pin ⓭ into the groove of the drive gear (right) assembly ⓮ .
7) Install the stopper washer ❻ .
8) Place the timing belt (L) ❸ around the gears of the RC gear assembly ❷ indicated in Fig. B, and its opposite side around the gear Ⓒ of the idler pulley assembly ❺ . (See Fig. E.)
9) Mount the RC gear assembly ❷ onto the axle ❹ with the timing belt (L) ❸ attached, and engage it with the gear of the RK gear assembly ⓯ .
10) Install the stopper washer ❶ .
11) Grease parts of the loading lever assembly ❽ indicated in Fig. C.
12) Mount the pinch roller sub arm assembly as described in section 3-14.
13) Mount the DC motor (capstan motor) as described in section 3-3.

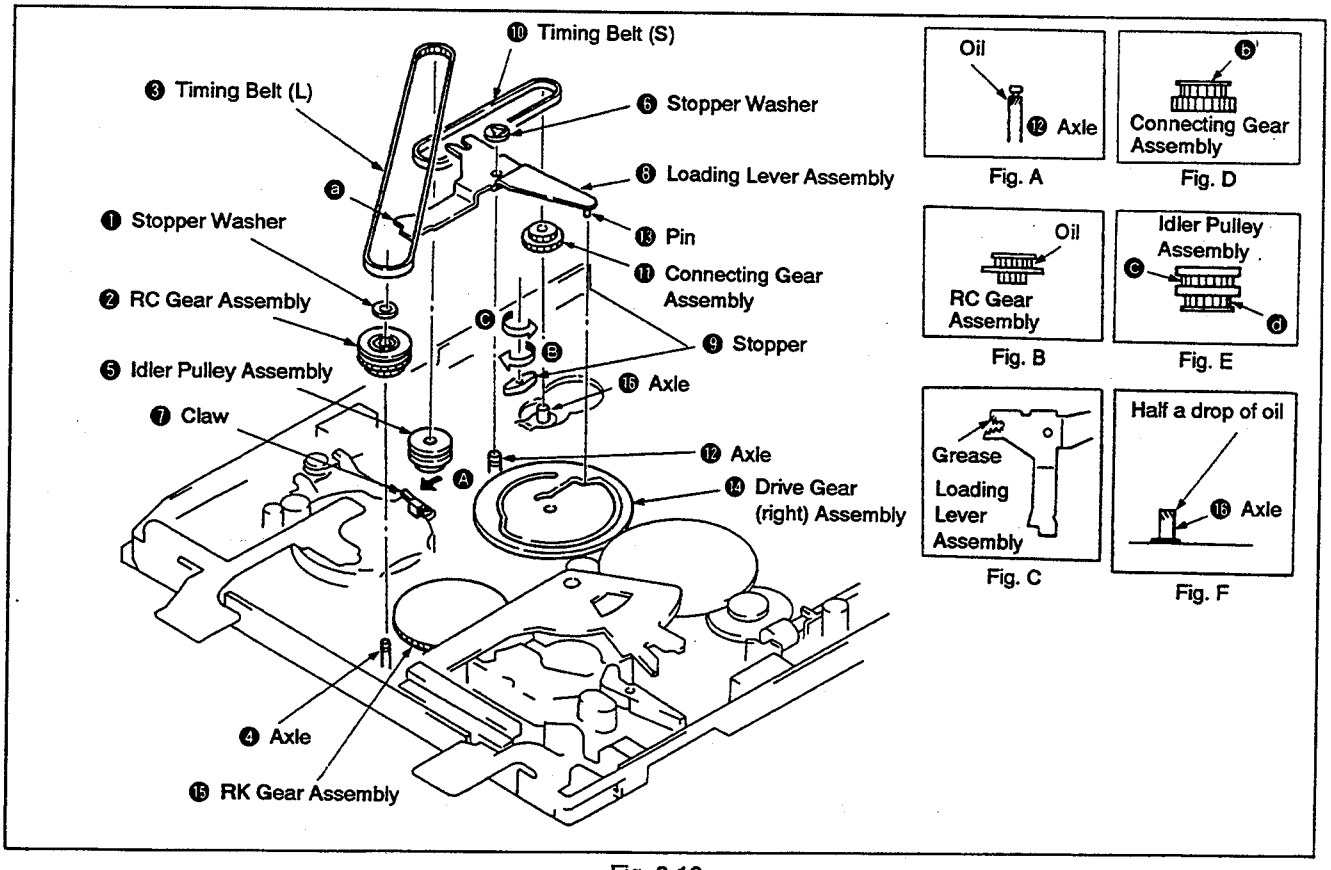


Fig. 3-16.

3-16. IDLER PULLEY, TS BRAKE ASSEMBLY, LB GEAR ASSEMBLY, RK GEAR ASSEMBLY

1. Removal (See Fig. 3-17.)

1) Remove the DC motor (capstan motor) as described in section 3-3.
2) Remove the switch lever assembly as described in section 3-14.
3) Remove the timing belt (L), the RC gear assembly, the loading lever assembly, the timing belt (S) and the connecting gear assembly described in section 3-15.
4) Set the STOP mode.
5) Remove the stopper washer ❶, then remove the idler pulley ❷.
6) Open the claw ❸, then remove the TS brake assembly ❹.
7) Remove the torsion coil spring (LB) ❺.
8) Remove the stopper washer ❻, then remove the LB gear assembly ❼.
9) Remove the RK gear assembly ❽.

Note: When removing the idler pulley ❷, take care not to touch the flange section ⓐ. (See Fig. C.)

2. Installation (See Fig. 3-17.)

1) Apply half a drop of oil to the axle ❾ (See Fig. A).
2) Mount the RK gear assembly ❽ onto the axle ❾, keeping it in horizontal position.
3) Apply half a drop of oil to the axle ❿ (See Fig. B).
4) Mount the LB gear assembly ❼ onto the axle ❿ and secure it with the stopper washer ❻.
5) Insert the torsion coil spring (LB) ❺ into the axle ⓫, then hook it to the mechanism chassis notch ⓬ and to the tab ⓭.
6) Mount the TS brake assembly ❹ and close the claw ❸.
7) Apply half a drop of oil to the axle ⓮ (See Fig. D).
8) Mount the idler pulley ❷ onto the axle ⓯, then secure it with the stopper washer ❶.
9) Mount the timing belt (L) , the RC gear assembly, the loading lever assembly, the timing belt (S) and the connecting gear assembly as described in section 3-15.
10) Mount the switch lever assembly as described in section 3-14.
11) Mount the DC motor (capstan motor) as described in section 3-3.

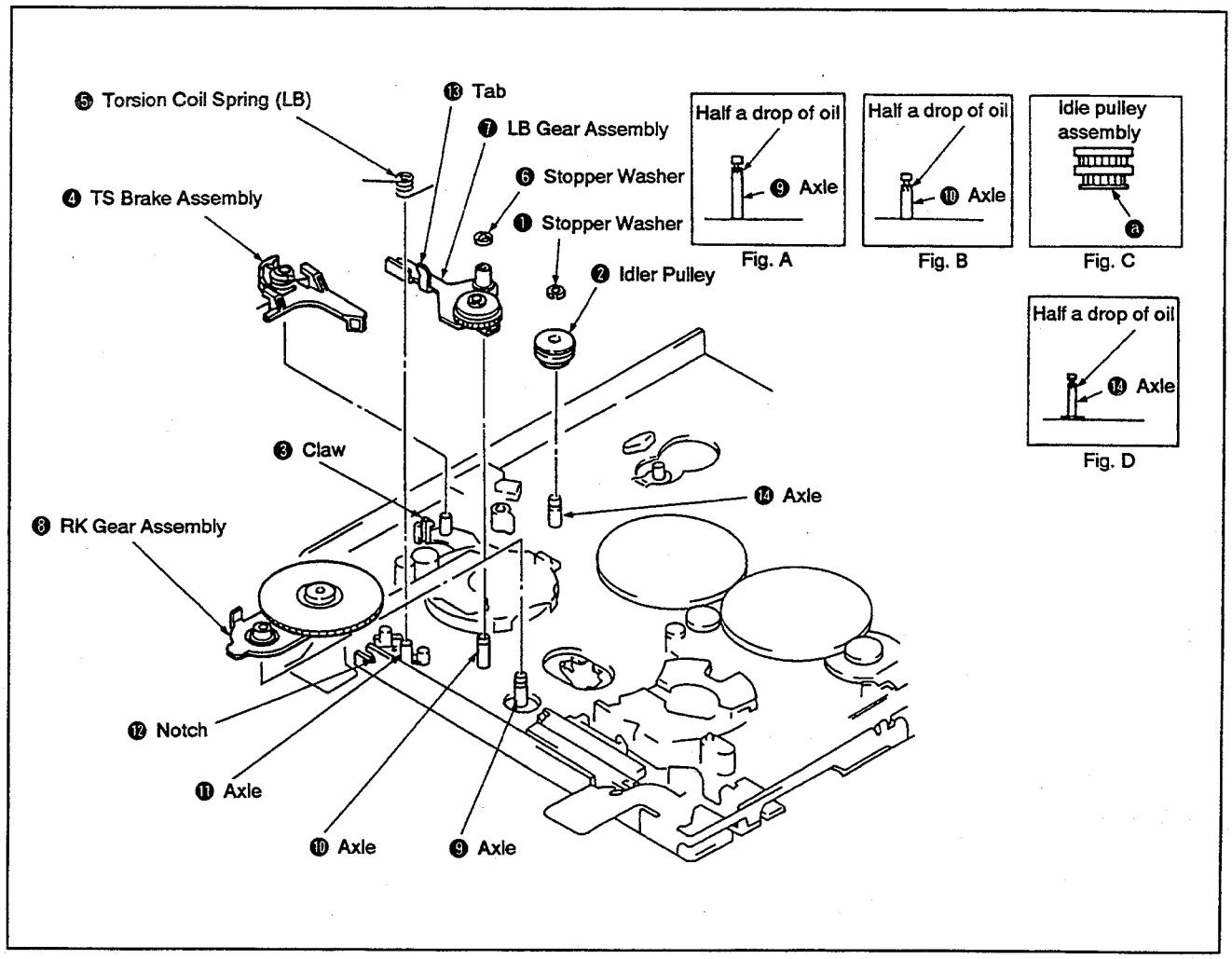


Fig. 3-17.

3-17. UL GEAR, UL BRAKE, UL ARM, LB PLATE SPRING

1. Removal (See Fig. 3-18.)

1) Remove the switch lever assembly as described in section 3-14.
2) Remove the stopper washer ❶, then remove the UL gear ❷.
3) Remove the UL arm ❸, the 1.6 mm-diameter poly washer ❹ and the LB plate spring ❺.
4) Remove the UL brake ❻.

2. Installation (See Fig. 3-18.)

1) Mount the UL brake ❻.
2) Apply half a drop of oil to the axle ❼ (See Fig. A).
3) Mount the LB plate spring ❺ to the axle ❼ as shown in Fig. B, then install the 1.6mm-diameter poly washer ❹.
4) Mount the UL arm ❸ to the axle ❼ so that the protrusion ❽ comes into the groove ❾ of the UL brake ❻.
5) Mount the UL gear ❷ to the axle ❼ and engage it with the gear of the drive gear (left) assembly ❿.
6) Install the stopper washer ❶.
7) Mount the switch lever assembly as described in section 3-14.

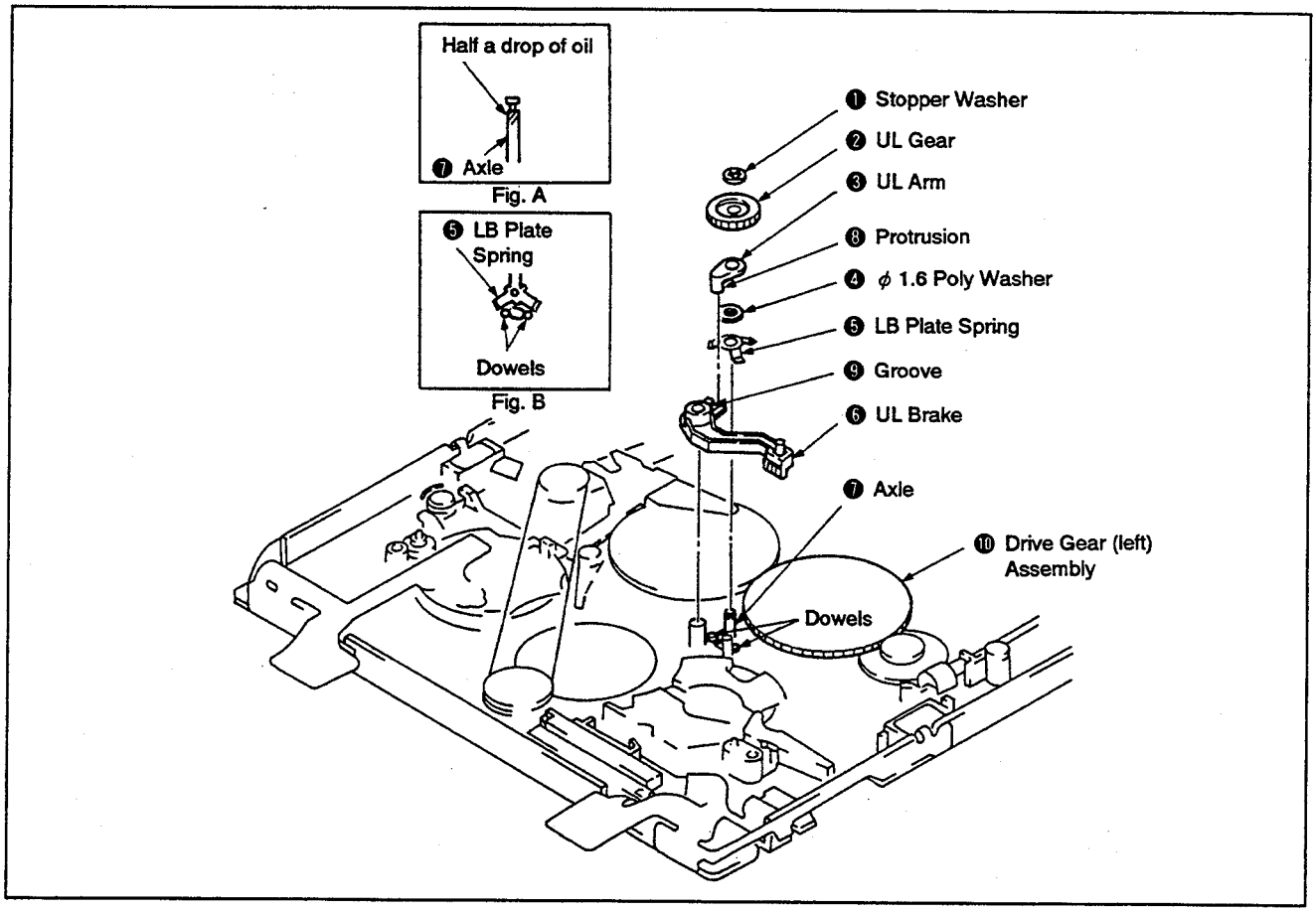


Fig. 3-18.

3-18. COASTER (RIGHT) ASSEMBLY, DRIVE GEAR (RIGHT) ASSEMBLY

1. Removal (See Fig. 3-19.)

1) Remove the DC motor (capstan motor) as described in section 3-3.
2) Remove the drum unit as described in section 3-13.
3) Remove the switch lever assembly as described in section 3-14.
4) Remove the timing belt (L) , the RC gear assembly and the loading lever assembly as described in section 3-15.
5) Set the STOP mode.
6) Remove the screw ❶ , then remove the coaster plate spring ❷ and the coaster (right) assembly ❸ .
7) Remove the two screws ❹ , then remove the reinforcing plate TT ❺ .
8) Remove the stopper washer 1.5 ❻ , then remove the drive gear (right) assembly ❼ .

2. Installation (See Fig. 3-19.)

1) Grease the points of the mechanism chassis shown in Fig A.
2) Apply half a drop of oil to the axle ❽ (See Fig. F).
3) Grease pin ❾ , axle ❿ and dowel ⓮ of the coaster (right) assembly ❸ (See Fig. D).
4) Mount by aligning the pin ❾ and the axle ❿ with the slot ⓫ of the mechanism chassis.
5) Move the brake release arm ⓬ in the direction of the arrow Ⓐ to put it out of the way.
6) Mount the drive gear (right) assembly ❼ to the axle ❽ , and engage it with the drive gear (left) assembly ⓭ as shown in Fig. B.
7) Align the ⓐ part with the ⓑ part, and the hole ⓮ with the pin ❾ of the coaster (right) assembly ❸ .
8) Install the stopper washer 1.5 ❻ .
9) Mount by aligning the coaster plate spring ❷ with the axle ❿ of the coaster (right) assembly ❸ and pin ❾ , then secure with the screw ❶ .
10) Mount the reinforcing plate TT ❺ aligning it with the dowel ⓯ , then tighten the two screws ❹ in the indicated order.
11) Grease the points indicated in Figs. C and E.
12) Mount the timing belt (L) , the RC gear assembly and the loading lever assembly as described in section 3-15.
13) Mount the switch lever assembly as described in section 3-14.
14) Mount the drum unit as described in section 3-13.
15) Mount the DC motor (capstan motor) as described in section 3-3.

Note: • Screw ❶ should be tightened with a tightening torque of approx. 500g•cm. If tightened too much, the coaster (right) assembly ❸ and the coaster plate spring ❷ will be deformed.

◦ After installing, be sure to perform tape path adjustment as described in section 4.

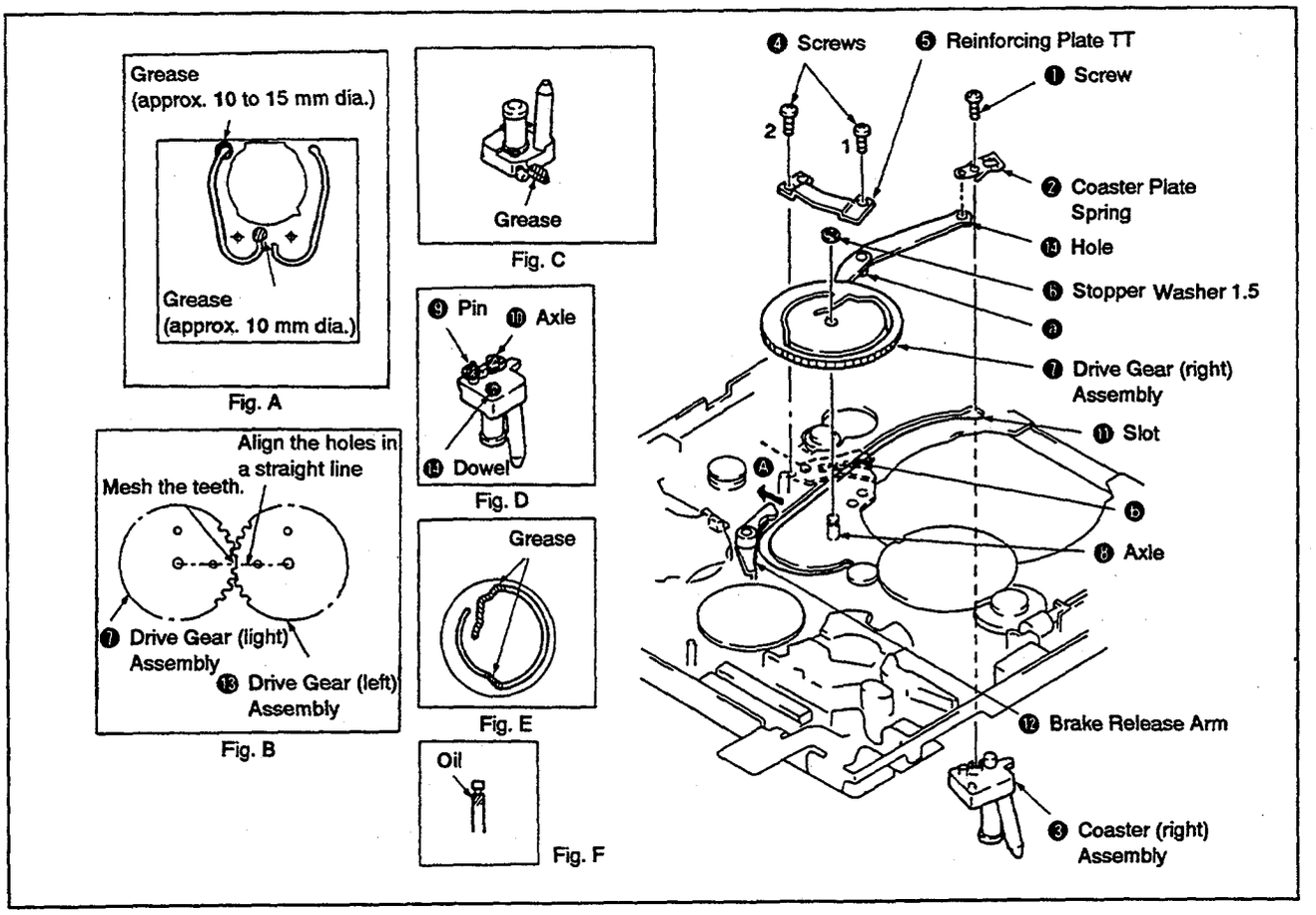


Fig. 3-19.

3-19. COASTER (LEFT) ASSEMBLY, DRIVE GEAR (LEFT) ASSEMBLY

1. Removal (See Fig. 3-20.)

1) Remove the DC motor (capstan motor) as described in section 3-3.
2) Remove the drum assembly as described in section 3-13.
3) Remove the switch lever assembly and the pinch roller sub-arm assembly as described in section 3-14.
4) Remove the timing belt (L), the RC gear assembly and the loading lever assembly as described in section 3-15.
5) Remove the coaster (right) assembly and the drive gear (right)assembly as described in section 3-18.
6) Remove the screw ❶, then remove the coaster plate spring ❷ and the coaster (left) assembly ❸.
7) Remove the two screws ❹, then remove the reinforcing plate SS assembly ❺.
8) Remove the stopper washer 1.5 ❻, then remove the drive gear (left) assembly ❼.

2. Installation (See Fig. 3-20.)

1) Grease the points of the mechanism chassis shown in Fig A.
2) Apply half a drop of oil to the axle ❽ (See Fig. E).
3) Grease pin ❾, axle ❿ and dowel ⓯ of the coaster (left) assembly ❸ (See Fig. B).
4) Mount by aligning the pin ❾ and the axle ❿ with the slot ⓫ of the mechanism chassis.
5) Fit the drive gear (left) assembly ❼ to the axle ❽, and mount so that the gear engages with the wheel gear ⓬ and the UL gear ⓭.
6) Align the ⓐ part with the slot ⓫, and the hole ⓮ with the pin ❾ of the coaster (left) assembly ❸.
7) Install the stopper washer 1.5 ❻.
8) Mount by aligning the coaster plate spring ❷ with the axle ❿ and pin ❾ of the coaster (left) assembly ❸, then secure with the screw ❶.
9) Mount the reinforcing plate SS assembly ❺ aligning it with the dowel ⓯, then tighten the two screws ❹ in the indicated order.
10) Grease points indicated in Figs. C and D.
11) Mount the coaster (right) assembly and the drive gear (right)assembly as described in section 3-18.
12) Mount the timing belt (L), the RC gear assembly and the loading lever assembly as described in section 3-15.
13) Mount the switch lever assembly and the pinch roller sub arm assembly as described in section 3-14.
14) Mount the drum assembly as described in section 3-13.
15) Mount the DC motor (capstan motor) as described in section 3-3.

Note:
- Screw ❶ should be tightened with a tightening torque of approx. 500g•cm. If tightened too much, the coaster (right) assembly ❸ and the coaster plate spring ❷ will be deformed.
- After installing, be sure to perform tape path adjustment as described in section 4.

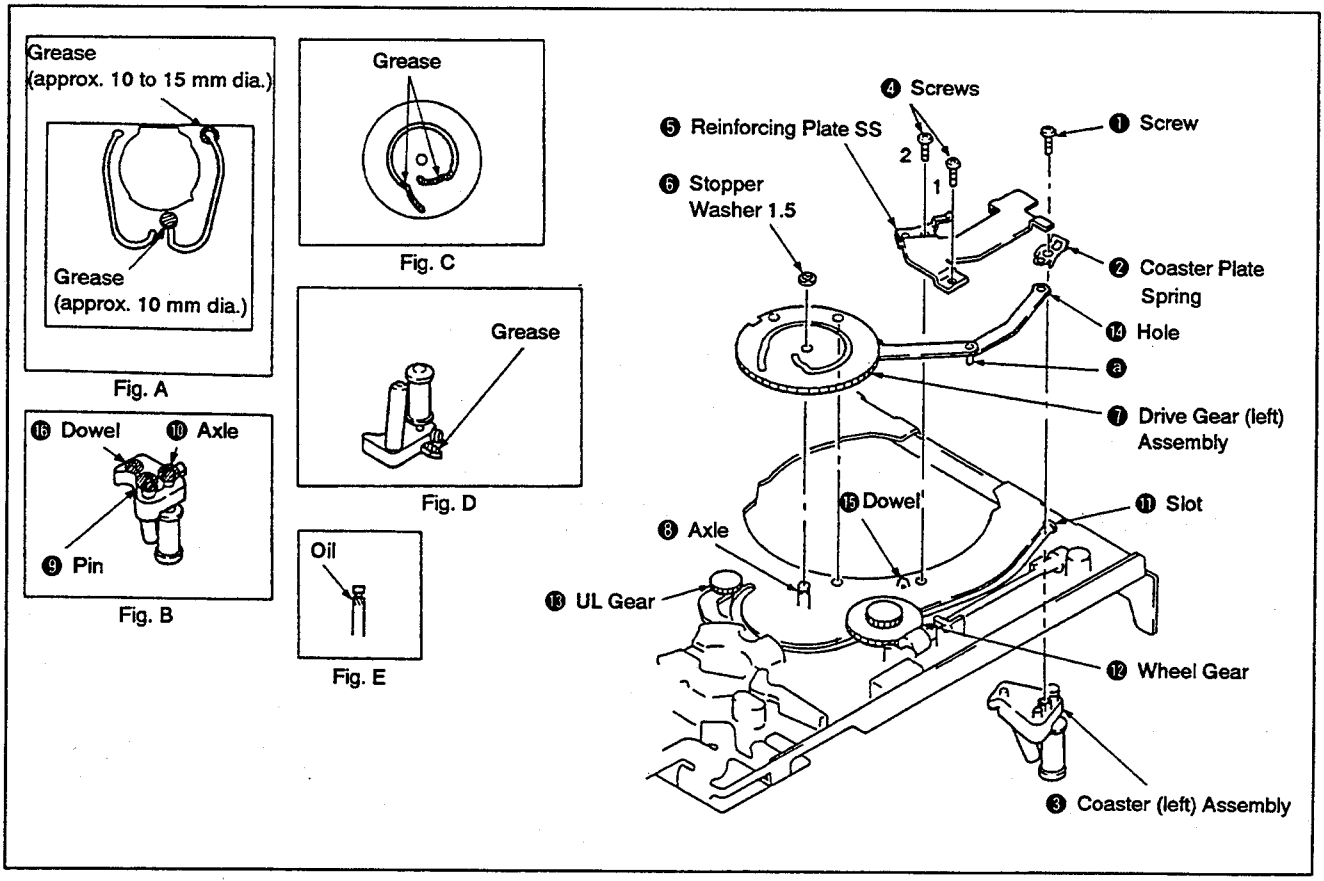


Fig. 3-20.

3-20. LOADING MOTOR, BRAKE RELEASE ARM, WHEEL GEAR, WORM ASSEMBLY

1. Removal (See Fig. 3-21.)

1) Remove the DC motor (capstan motor) as described in section 3-3.
2) Remove the switch lever assembly and the pinch roller sub arm assembly as described in section 3-14.
3) Remove the timing belt (L), the RC gear assembly and the loading lever assembly as described in section 3-15.
4) Remove the drive gear (right) assembly as described in section 3-18.
5) Remove the drive gear (left) assembly as described in section 3-19.
6) Remove the two screws ❶, then remove the loading motor assembly ❷.
7) Remove the brake release arm ❸.
8) Remove the stopper washer ❹, then remove the wheel gear ❺.
9) Remove the worm assembly ❻ from the six claws ❼.

2. Installation (See Fig. 3-21.)

1) Mount the worm assembly ❻, matching it to the six claws ❼.
2) Grease the shaded parts of the worm assembly ❻ (five places) (see Fig A).
3) Apply half a drop of oil to the axle ❽ (See Fig. B).
4) Fit the wheel gear ❺ to the axle ❽ and engage it with the gear of the worm assembly ❻.
5) Mount the brake release arm ❸.
6) Grease the whole perimeter of the gear of the loading motor assembly ❷.
7) Align the loading motor assembly ❷ with the mechanism chassis and secure it with the two screws ❷.
8) Mount the drive gear (left) assembly as described in section 3-19.
9) Mount the drive gear (right) assembly as described in section 3-18.
10) Mount the timing belt (L), the RC gear assembly and the loading lever assembly as described in section 3-15.
11) Mount the switch lever assembly and the pinch roller sub arm assembly as described in section 3-14.
12) Mount the DC motor (capstan motor) as described in section 3-3.

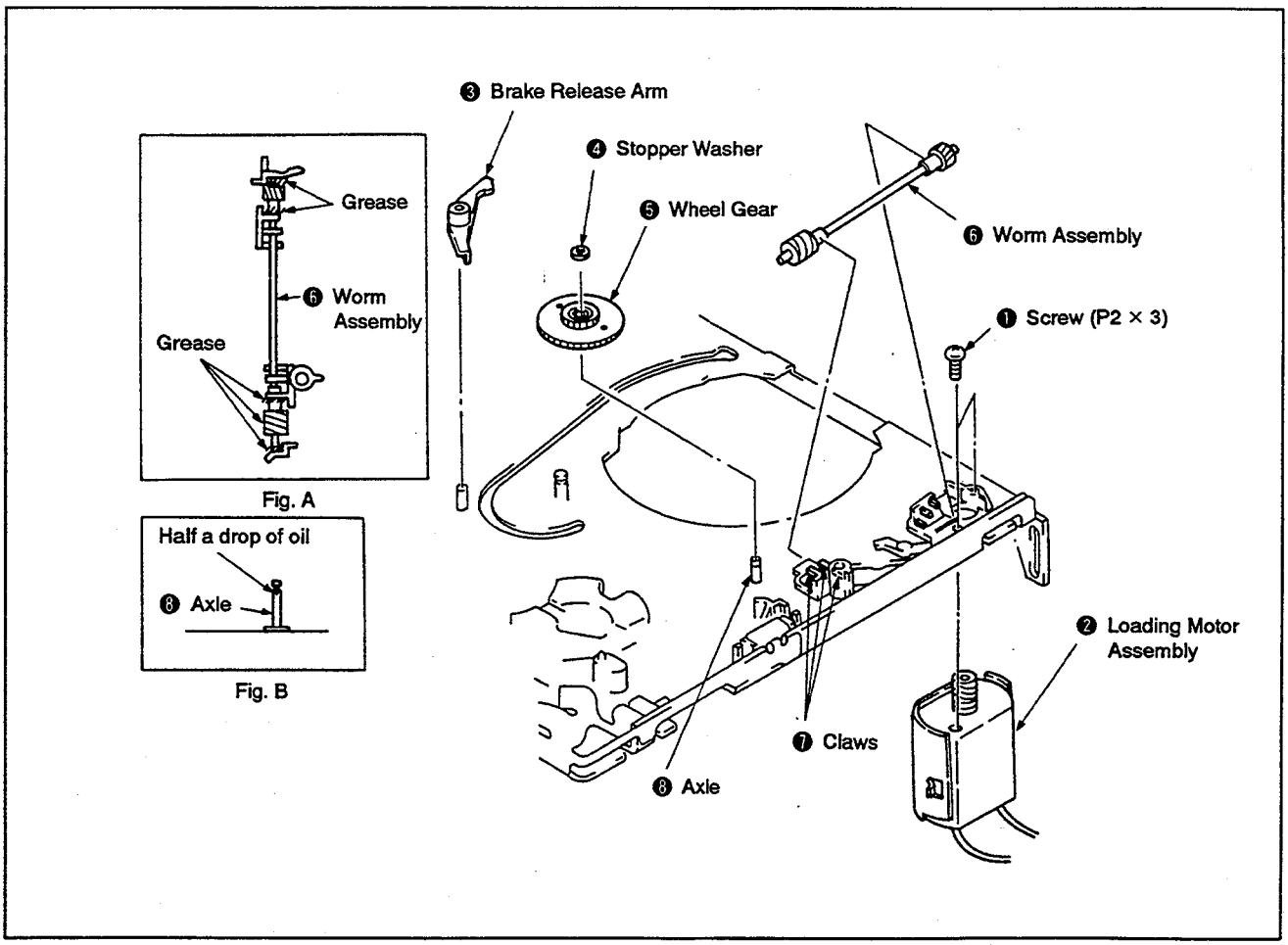


Fig. 3-21.

3-21. ROTARY UPPER DRUM REPLACEMENT

1. Removal

- If possible, make a recording before removal.

1) Detach the six solderings ❸, then use a pair of tweezers or the like to confirm that the terminals passing through the board holes from below can move freely.
2) Remove the two screws ❶ (See Fig. 3-22).
3) Mount the jig ❹ (Ref. No. J-7) with the two supplied screws ❷, then screw the attached hexagon socket screws ❸ to the jig ❹. The rotary upper drum ❺ will move upward and come off (See Fig. 3-23).

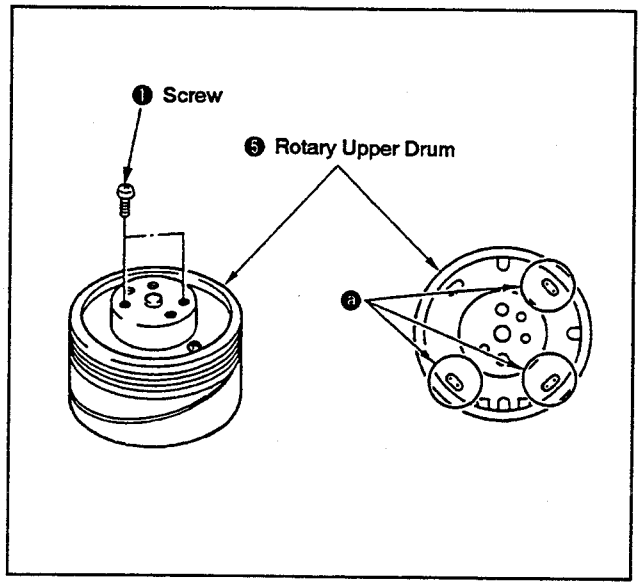


Fig. 3-22.

2. Installation

1) Wipe clean the flange surface and the rotary upper drum ❺ surface that makes contact with it, and confirm that they are free from dirt and scratches.
2) Insert the jig ❼ (Ref. No. J-7) into the drum positioning hole, then set the rotary upper drum ❺ by passing the jig through its positioning hole ❻.
   Note: Confirm that the terminals ❽ protrude slightly from the rotary upper drum board holes (See Fig. 3-24).
3) Remove the jig ❼ and push down the rotary upper drum ❺ gently by hand. If it does not go all the way down, secure it temporarily by tightening the two hexagon socket screws ❶ alternately.
4) Insert the jig ❼ into the positioning hole ❻ again and confirm that it goes in smoothly. If it does not, loosen the two screws ❶, repeat step 3 of the Removal paragraph and restart the setting procedure.
5) Tighten the screws ❶.
6) Solder the terminals ❽ (ⓐ in Fig. 3-22).
   Note: Take care that no solder flows below the board.

Note: After installing, be sure to perform tape path adjustment as described in section 4.

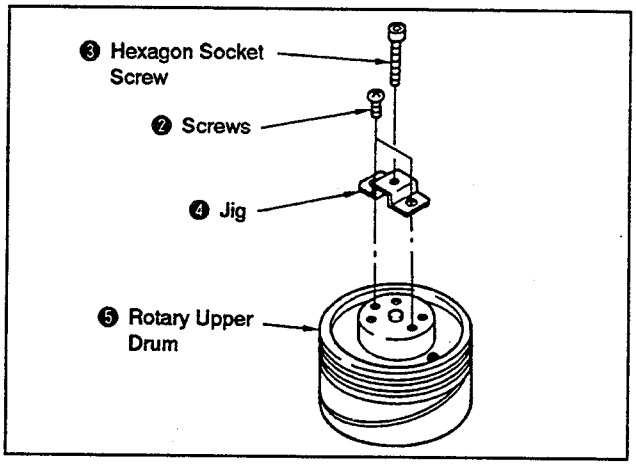


Fig. 3-23.

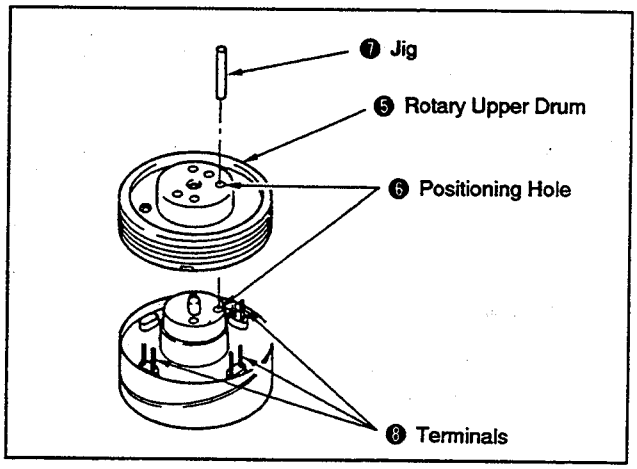


Fig. 3-24.

3-22. FWD BACK TENSION (See Fig. 3-25.)

1) Set the torque cassette (Ref. No. J-6).
2) Set the FWD mode and confirm that S reel table torque value is within 9 to 13 g•cm.
3) If the torque value does not meet the specification, adjust the adjust arm ❶.

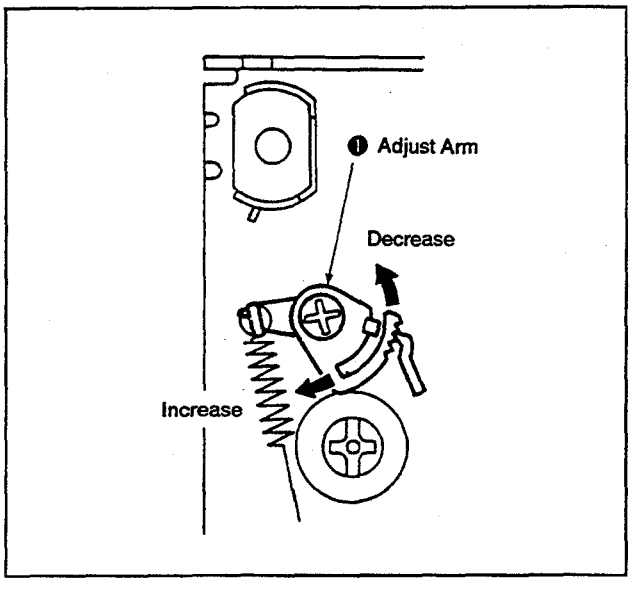


Fig. 3-25.

3-23. REEL TORQUE CHECK

1) Set the torque cassette.
2) Set the FWD mode and confirm that T reel table torque value is within 7 to 15 g•cm.
3) Set the REV mode and confirm that S reel table torque value is within 29 ± 6 g•cm.
4) Set the REV mode and confirm that T reel table torque value is within 13 to 25 g•cm.
5) If a torque value does not meet the specifications above, replace the corresponding reel table.

4. TAPE PATH ADJUSTMENT

[The Track Shift Mode]

In the 8 mm video system, instantaneous tape speed control is performed using four kinds of pilot signals, and high-precision tracking is achieved through the ATF (Automatic Track Finding) system. This makes a tracking control knob unnecessary and allows for precise tracing.

On the other hand, however, tape path adjustment presents some difficulties when the ATF system is used. Namely, since the ATF system will automatically compensate to some degree for head tracing errors, thorough adjustment is not possible.

This can be solved by setting the track shift mode for tracking fine adjustment. ATF will be compulsorily activated, shifting the tracking amount by a fixed amount (approx. 1/4) and thus making tracking fine adjustment easy. Furthermore, no track shift jigs are required.

4-1. TRACK SHIFT MODE SETTING

[Setting Procedure]

- Connect the TEST A and TEST B terminals to the COM terminal.

  Example:

  NTSC ····· GV-8

  PAL ····· GV-8E

  Connect Pins ① and pin ③ of CN017 on the { SV-34 board (GV-8) / SV-35 board (GV-8E) } to pin ② of it. (See Fig. 4-1)

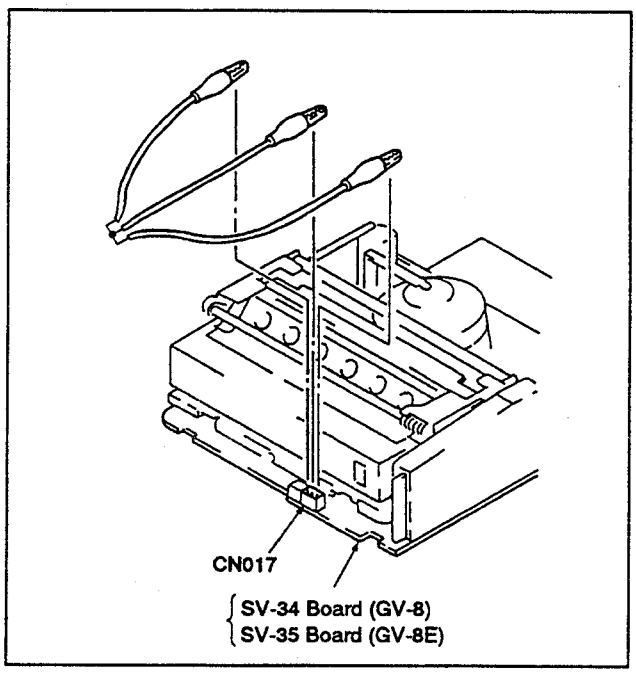
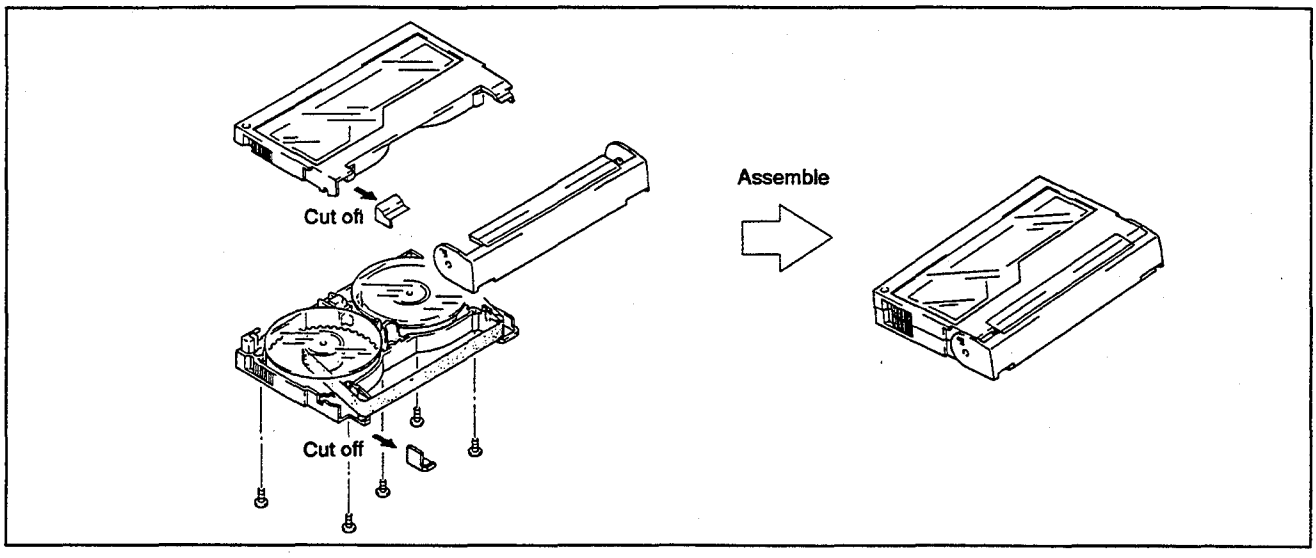


Fig. 4-1.

[Note on Adjustment of No.7 Guide (TG-7)]

The height adjustment screw for No.7 guide (TG-7) is located at some distance from the guide (refer to Fig. 4-2).

Therefore, when performing section 4-6. No.7 Guide (TG-7) Adjustment it is convenient to use the alignment tape for tracking (Ref. No. J-5), modified as follows, and perform adjustment in playback mode.



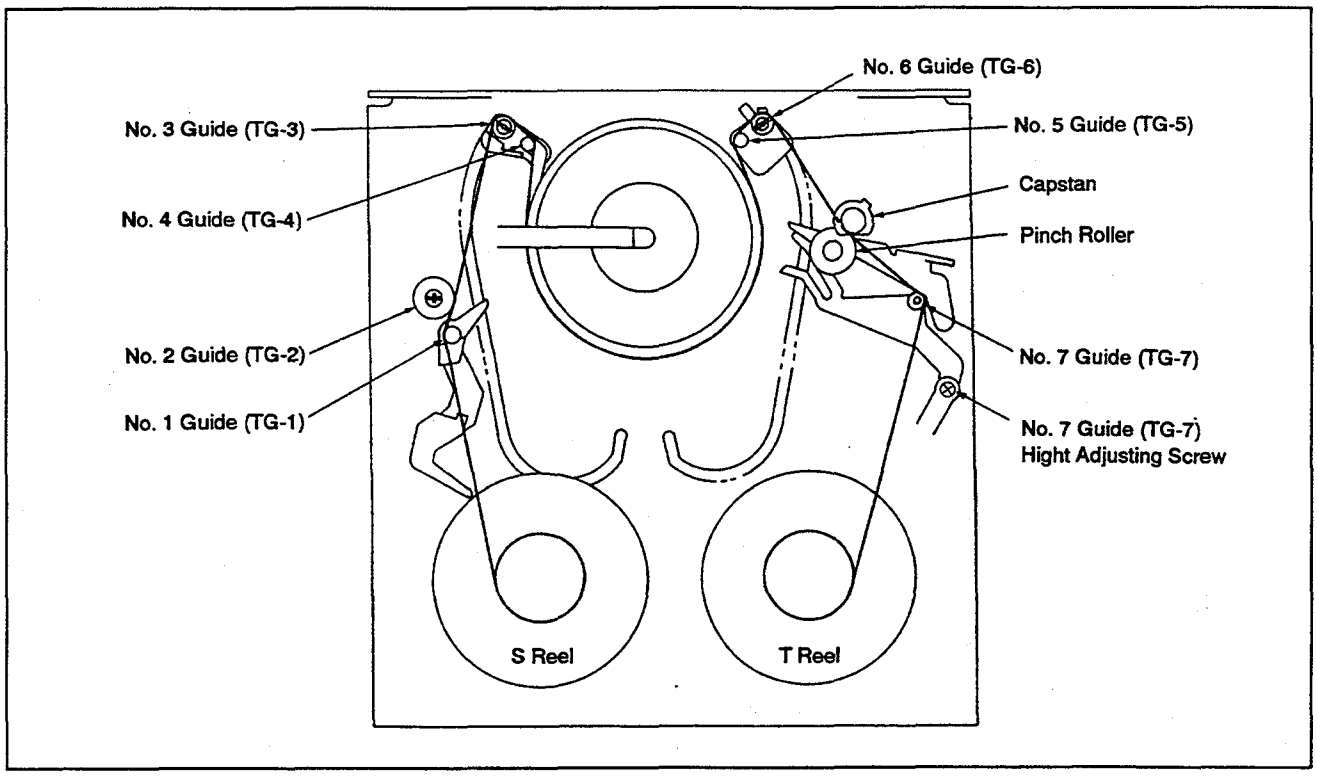


Fig. 4-2.

4-2. PREPARATIONS FOR ADJUSTMENT

1) Clean tape path surfaces (tape guides, drum, capstan shaft, pinch roller) (See Fig. 4-2).
2) Connection of oscilloscope and output method of waveform.
   CH 1: RF signal output of the drum head (V RF OUT)
   Method for signal output:
   Short-circuit the external trigger output (RF SW. P) and GND.

   Example:
   NTSC ····· GV-8
   PAL ····· GV-8E
   CH 1: Pin ③ (V RF OUT) of CN018 on the
   { SV-34 board (GV-8)
   { SV-35 board (GV-8E)
   Method for signal output:
   Short-circuit pin ① (GND) and pin ② (RF SW.P) of CN018 on the
   { SV-34 board (GV-8)
   { SV-35 board (GV-8E)
3) Play back the alignment tape for tracking adjustment (Ref. No. J-5).
4) Confirm that both the entrance and exit side RF waveforms of the oscilloscope are flat (See Fig. 4-4). If they are not, adjust as follows.

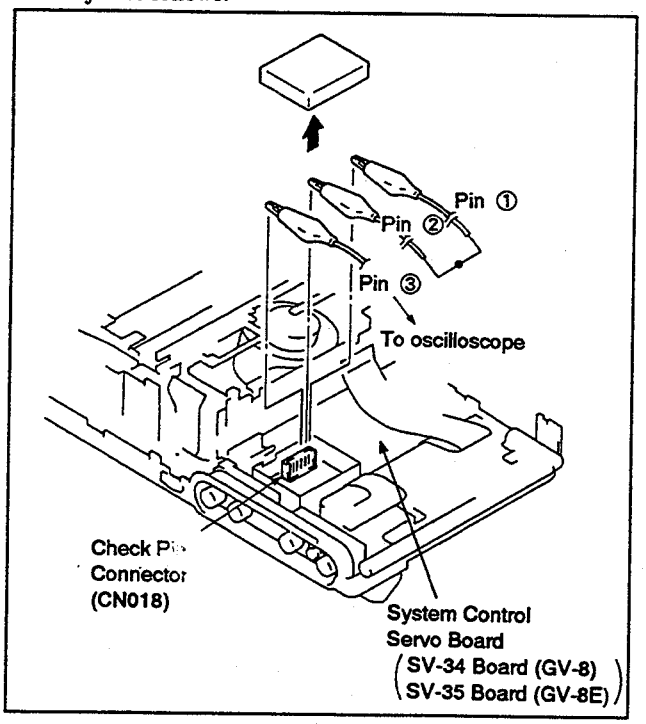


Fig. 4-3.

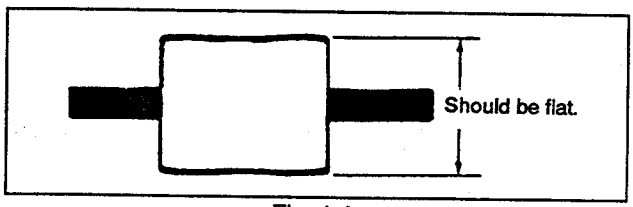


Fig. 4-4.

4-3. TRACKING ADJUSTMENT (See Fig. 4-5.)

1) Play back the alignment tape for tracking adjustment.
2) Pass a hexagonal wrench, screwdriver (Ref. No. J-11) or the like through the hole ❶, loosen the lockscrew ❷ a little, then make the entrance side waveform flat by turning the No. 3 guide (TG-3) ❸.
3) Pass a hexagonal wrench, screwdriver or the like through the hole ❹, loosen the lockscrew ❺ a little, then make the exit side waveform flat by turning the No. 6 guide (TG-6) ❻.

Note: Take care not to loosen lockscrews too much, since guides come loose easily.

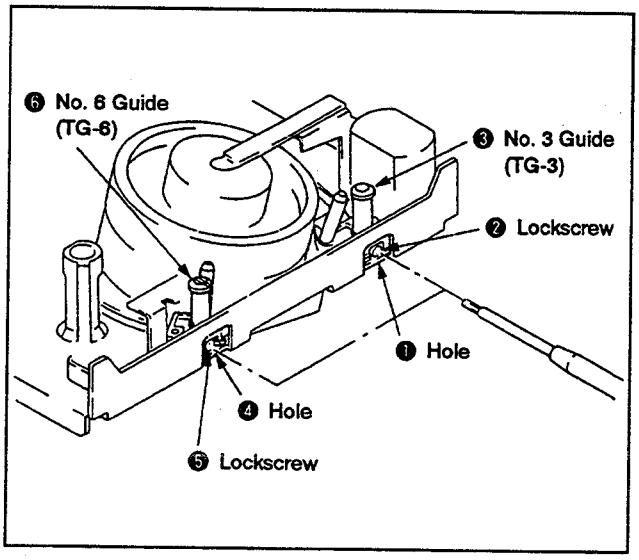


Fig. 4-5.

4-4. TRACKING FINE ADJUSTMENT (See Figs. 4-5. and 4-6.)

1) Play back the alignment tape for tracking adjustment and set the track shift mode.
2) Confirm whether the waveform is flat. If it is not, turn the No. 3 (TG-3) and No. 6 (TG-6) guides so that it becomes flat.
3) Fix the No. 3 guide ❸ by tightening its lockscrew ❷. Then confirm that the entrance side waveform has not changed.
4) Fix the No. 6 guide ❻ by tightening its lockscrew ❺. Then confirm that the exit side waveform has not changed.

Note: The set screws ❷ and ❺ should be tightened with a tightening torgue of approx. 200g•cm ± 10%.
If tightened too much, there is danger of damaging the thread.

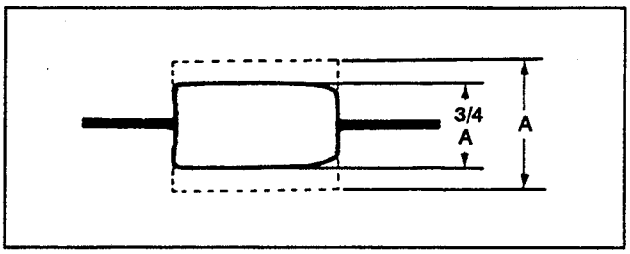


Fig. 4-6.

4-5. No. 2 GUIDE (TG-2) ADJUSTMENT

When the No. 2 guide has been turned or replaced, perform height presetting before this adjustment.

4-5-1. No. 2 Guide (TG-2) Height Presetting (See Fig. 4-7.)

1) Adjust the height from the mechanism chassis upper surface to the TG-2 upper flange ❶ upper surface to 18.6 mm by rotating the TG-2 upper flange ❶.

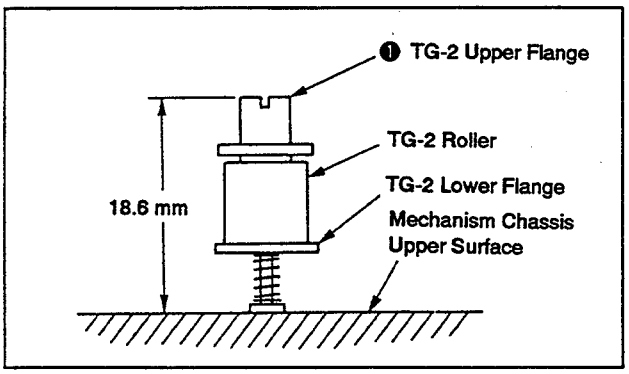


Fig. 4-7.

[Reference]
This U mechanism is equipped with four adjustable guides (TG-2, 3, 6 and 7). To raise or lower the respective guide rotate the corresponding adjustment screw as shown below.

Guide	Guide adjustment	Rotating direction of adjustment screw
TG-2, 3, 6	Raise	Counterclockwise
	Lower	Clockwise
TG-7	Raise	Counterclockwise
	Lower	Clockwise

4-5-2. No. 2 Guide (TG-2) Adjustment (See Figs. 4-8. and 4-9.)

1) Play back a thin tape like the P6-120MP, etc. and set the REV mode.
2) Confirm that the tape is not bent at the lower flange ❷ of the No. 2 guide (TG-2) ❶ (See Fig. 4-8). If it is, turn the upper flange ❸ of the No. 2 guide (TG-2) ❶ clockwise with a screwdriver, lowering it until the tape is straightened.
3) Play back the alignment tape for tracking adjustment.
4) Perform tracking adjustment and tracking fine adjustment as described in sections 4-3. and 4-4.
5) In the track shift mode, CUE/REV the tape, then play it back and confirm that the RF waveform rises flat within 2 seconds.
6) If the waveform is not normal (See Fig. 4-9), turn the upper flange ❸ of the No. 2 guide (TG-2) ❶ 90° counter-clockwise and repeat step 5.
   Repeat steps 5 and 6 until a normal waveform is obtained. Then, confirm that the tracking waveform has not changed. If it has, perform fine adjustment of entrance side tracking and repeat step 5.

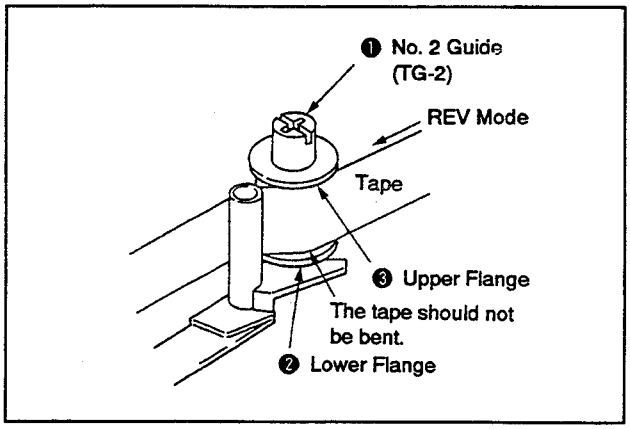


Fig. 4-8.

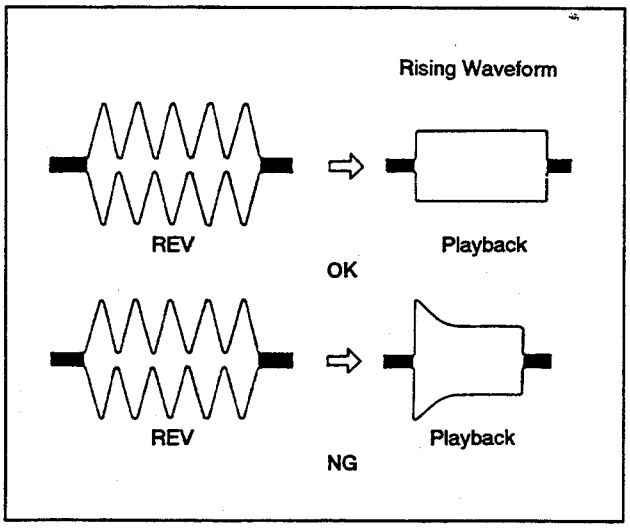


Fig. 4-9.

4-6. No. 7 GUIDE (TG-7) ADJUSTMENT (See Fig. 4-10.)

1) Play back the alignment tape for tracking adjustment and set the REV mode.
2) Confirm that the tape is not bent between the No. 6 guide (TG-6) ❶ and the capstan ❷ . If it is, turn the hight adjusting screw ❹ of the No. 7 guide (TG-7) ❸ until the tape is straightened.
3) Set the playback mode again and confirm that the tape is not bent between the capstan ❷ and the hight adjusting screw ❹ of the No. 7 guide (specification:0.5 mm or less) . If the tape is bent beyond the specification, turn the No. 7 guide (TG-7) ❸ until bending is within the specification (0.5 mm).
   If in the REV mode tape bending between the No. 6 guide (TG-6) ❶ and the capstan ❷ is 0.3 mm or less, adjustment can be considered completed.

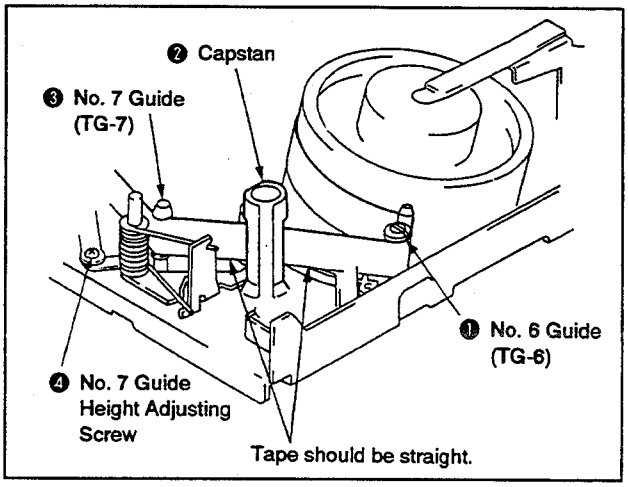


Fig. 4-10.

4-7. CUE AND REV WAVEFORM CHECK (See Fig. 4-11.)

1) Play back the alignment tape for tracking adjustment and set the REV mode. Confirm that waveform peaks maintain a constant pitch of 5 seconds or more (See Fig. 4-11). In case pitch is not constant, perform section 4-4. Tracking Fine Adjustment and section 4-6. No. 7 Guide Adjustment.
2) Set the CUE mode. Confirm that waveform peaks still maintain a constant pitch of 5 seconds or more (See Fig. 4-11). Otherwise, perform section 4-4. Tracking Fine Adjustment.

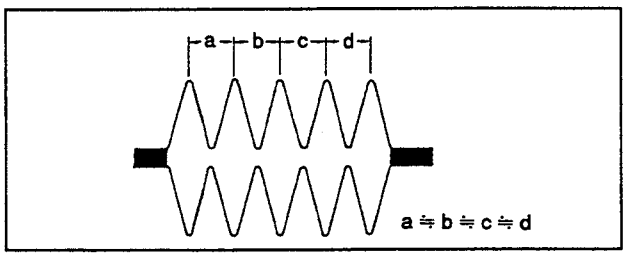


Fig. 4-11.

4-8. CHECK AFTER ADJUSTMENT

4-8-1. Tracking Check

1) Confirm that the amplitude of RF waveform is reduced to approx. 3/4 when the track shift mode is set (See Fig. 4-12).
2) Then, confirm that the minimum amplitude value (EMIN) is 65% of the maximum value (EMAX) or larger (See Fig. 4-13).
3) Confirm that no large fluctuations occur on the waveform (See Fig. 4-14).

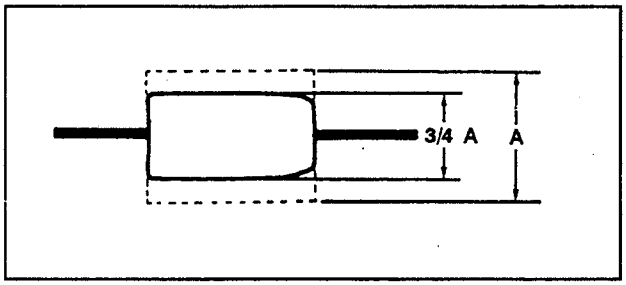


Fig. 4-12.

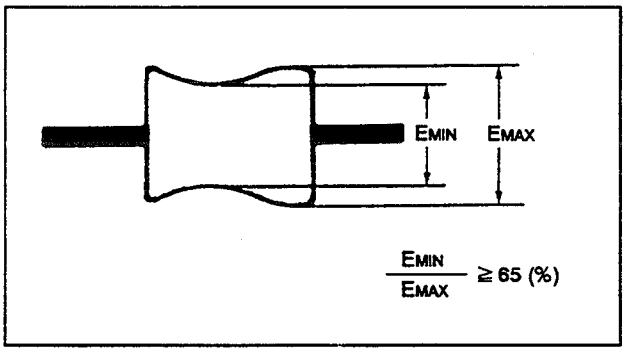


Fig. 4-13.

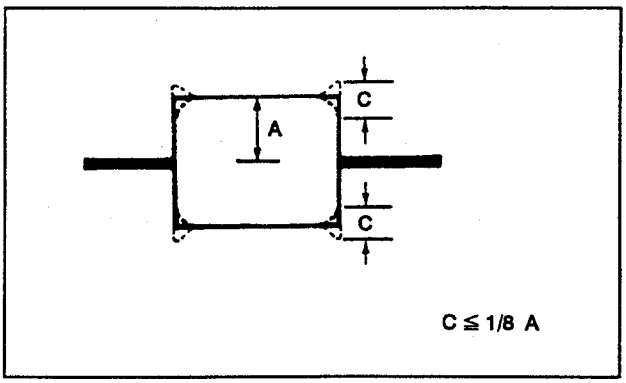


Fig. 4-14.

4-8-2. Rising Check (See Fig. 4-15.)

1) Play back the alignment tape for tracking adjustment.
2) Cancel the track shift mode.
3) Eject the tape, then load it again.
4) Set the playback mode and confirm that the RF waveform rises flat within 2 seconds. Also confirm that the tape is not bent around the pinch roller (See Fig. 4-15).
5) CUE/REV and FF/REW the tape, then play it back and confirm that the RF waveform rises flat within 2 seconds. Also confirm that the tape is not bent around the pinch roller.
6) Repeat steps 3) to 5) once more.

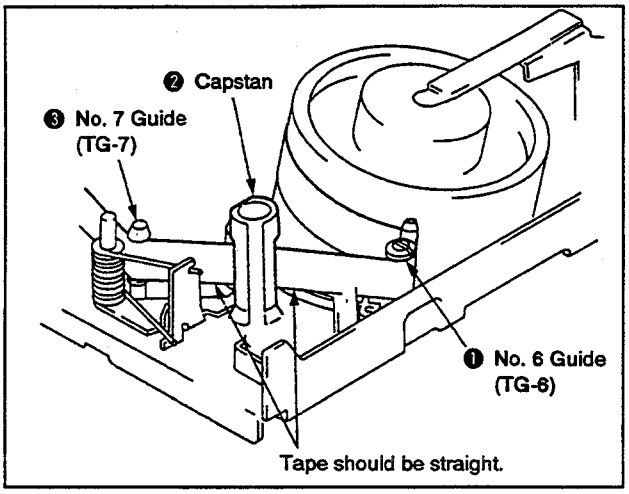


Fig. 4-15.

4-8-3. Tape Path Check (See Fig. 4-16.)

1) Play back a thin tape like the P6-120MP (NTSC) or P5-90MP (PAL), etc. and confirm that no tape rising occurs, and that curling is less than 0.3 mm, at the lower flange of the No. 2 guide, the upper flange of the No. 3 guide, the upper flange of the No. 6 guide and the No. 7 guide upper and lower flanges.
2) Confirm that no tape rising occurs and that curling is less than 0.3 mm at the flanges of all guide when pressing the FF button in the playback mode to set the CUE mode, or the REW button to set the REV mode.

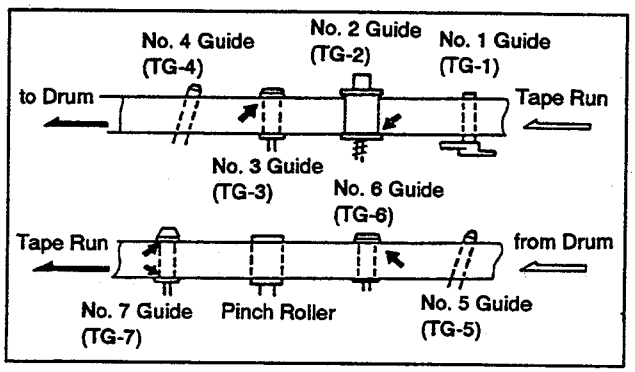
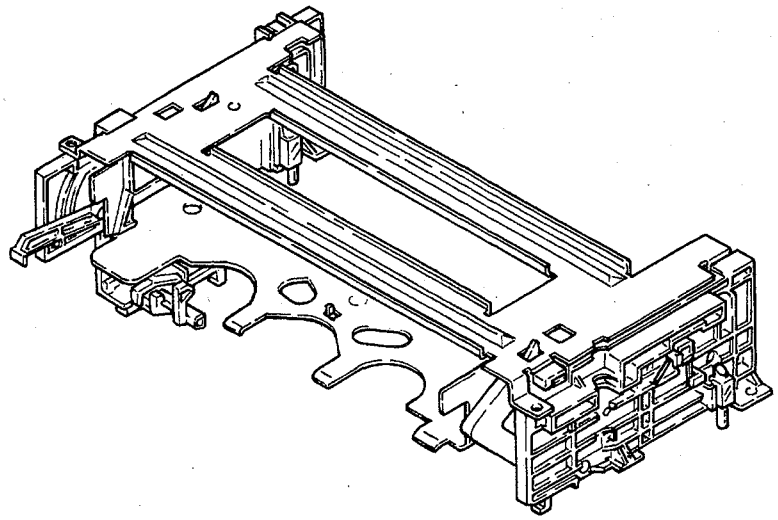


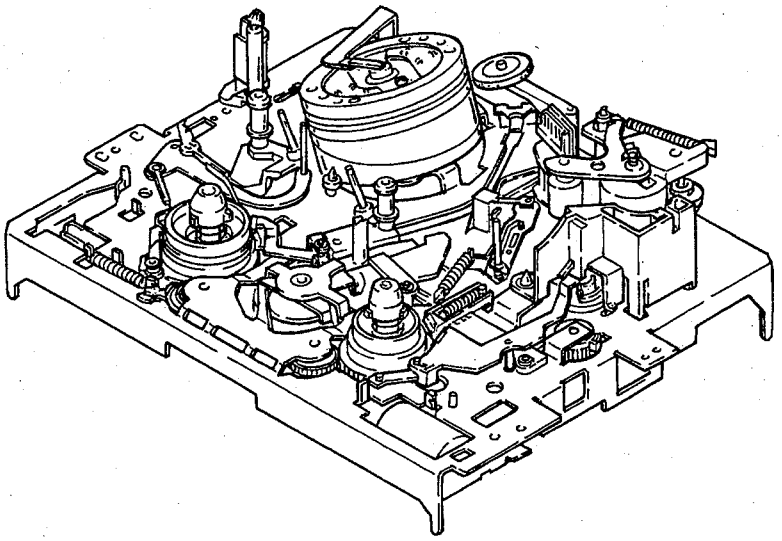
Fig. 4-16.

VHS MECHANICAL ADJUSTMENT MANUAL IV

H MECHANISM

Please use with the service manual.





MICROFILM

VHS VIDEO CASSETTE RECORDER

SONY®

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1. PREPARATION FOR MECHANISM CHECK ADJUSTMENT AND REPLACEMENT

Refer to the service manual, "DISASSEMBLY" for removal of the cabinet and boards.

1-1. LOADING AND THREADING PROCEDURE WHEN THE POWER TURNS OFF (Fig. 1-1)

1-1-1. LOADING AND THREADING PROCEDURE WITH HANDS

1) Turn cam motor in the arrow Ⓐ direction until loading and threading are end.

1-1-2. LOADING AND THREADING PROCEDURE WITH REGULATED DC POWER SUPPLY

1) Applying approx. +9 V (300 mA) to cam motor with regulated DC power supply makes it loading and threading.

Note: When loading and threading without cassette, claws are caught in four positions as following figure (in the order ① → ② → ③ → ④).
So release them with hands.

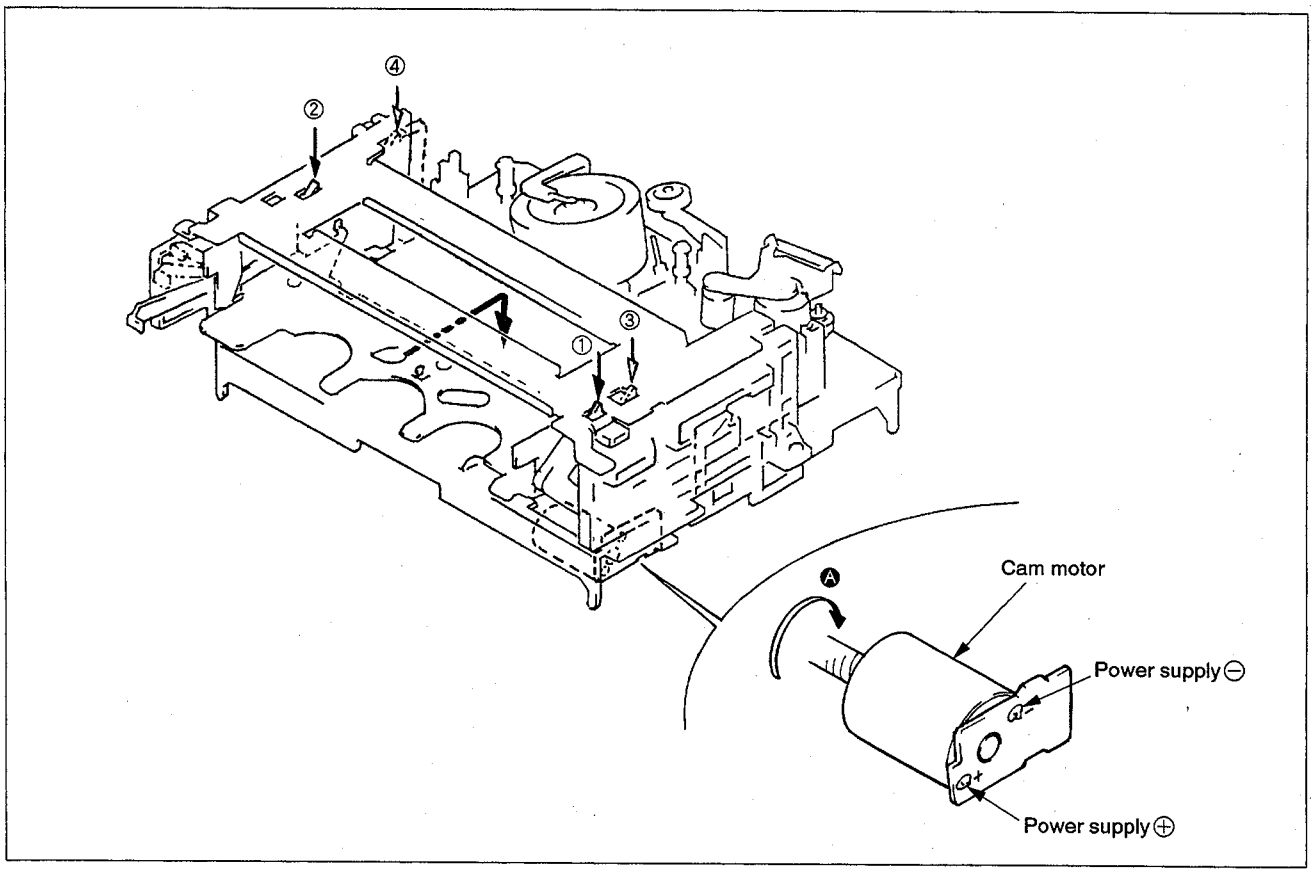


Fig. 1-1

1-2. UNLOADING AND UNTHREADING PROCEDURE WHEN THE POWER TURNS OFF (Figs. 1-2 and 1-3)

1-2-1. UNLOADING AND UNTHREADING PROCEDURE WITH HANDS

1) Turn cam motor in the arrow Ⓑ direction until unthreading is end.
2) Turn capstan motor in the arrow Ⓒ direction to take up tape in cassette.
3) Turn cam motor in the arrow Ⓑ direction until unloading is end.

1-2-2. UNLOADING AND UNTHREADING PROCEDURE WITH REGULATED DC POWER SUPPLY

1) Apply approx. +9 V (300 mA) to contrary polarities of cam motor.
2) Unthreading operation begins, tape guides return to their original positions (Unthreading operation is end but tape remains), then stop cam motor by turning power off.

Note: When unloading begins and cassette lid is closed, turn cam motor in the arrow Ⓐ direction to open tape guard.

3) Turn capstan motor in the arrow Ⓒ direction to take up tape in cassette.

Note: That tape is not caught at pinch roller. (Fig. 1-3)

4) Check that tape is not loosened completely, and apply approx. +9 V (300 mA) to contrary polarities of cam motor with regulated DC power supply. (Fig. 1-2)

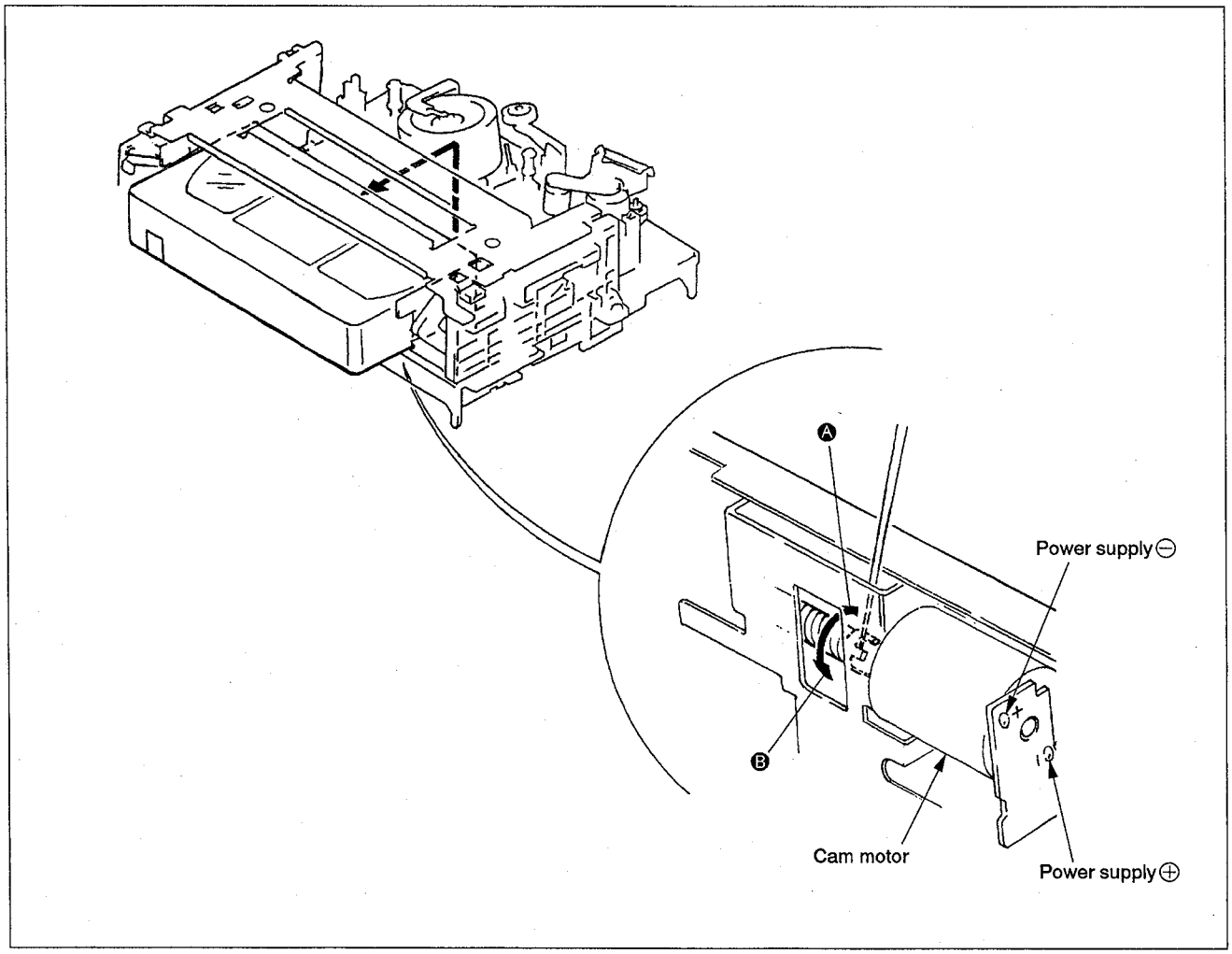


Fig. 1-2

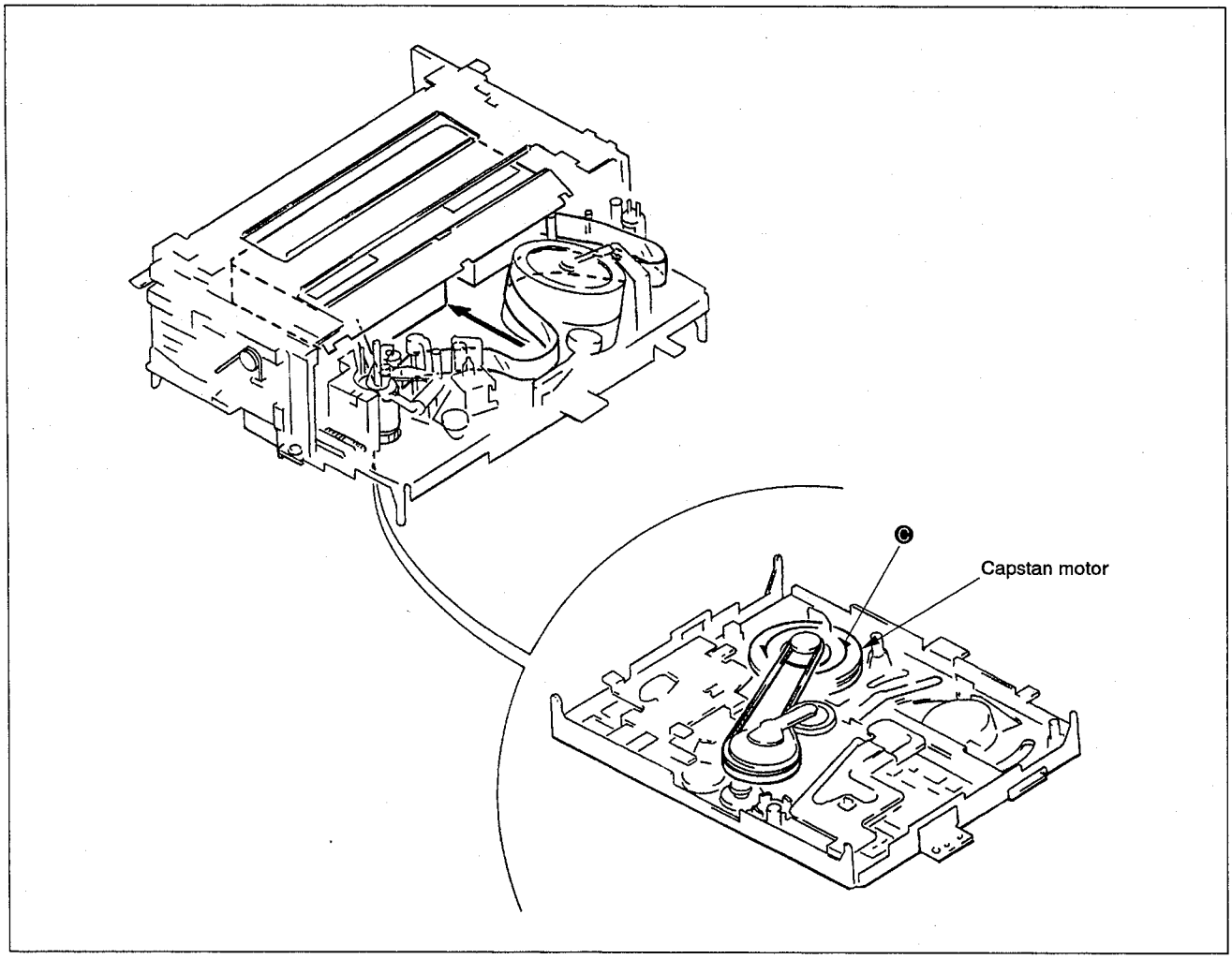


Fig. 1-3

1-3. HOW TO COMPLETE THREADING WITHOUT CASSETTE COMPARTMENT (Fig. 1-4)

Note 1: Put the FL block assembly removed the FL top plate on the bottom not to put dust or grease the top sensor and the end sensor luminous plates or not to scratch them. (Fig. A)

1) Pull out AC plug from wall outlet.
2) Shade near the end and top sensors with a black masking tape on the like.
3) Press cassette in/rec proof switch with a tip of screwdriver or the like.
4) Connect AC plug to wall outlet.
5) Release cassette in/rec proof switch by putting off a tip of screwdriver or the like.
   (At this time, power turns on, rewind operates for 10 seconds, after that power turns off.)

Note 2: In this condition, each mode can be set to video cassette recorder. (including recording mode)
However, fast forward should be done after rewinding for 15 seconds or more.

Note 3: After above mentioned operation, be sure to return the mode in the following order.

1) Remove the tape near the end and top sensors.
2) Pull out AC plug from wall outlet to reset the system control microcomputer.

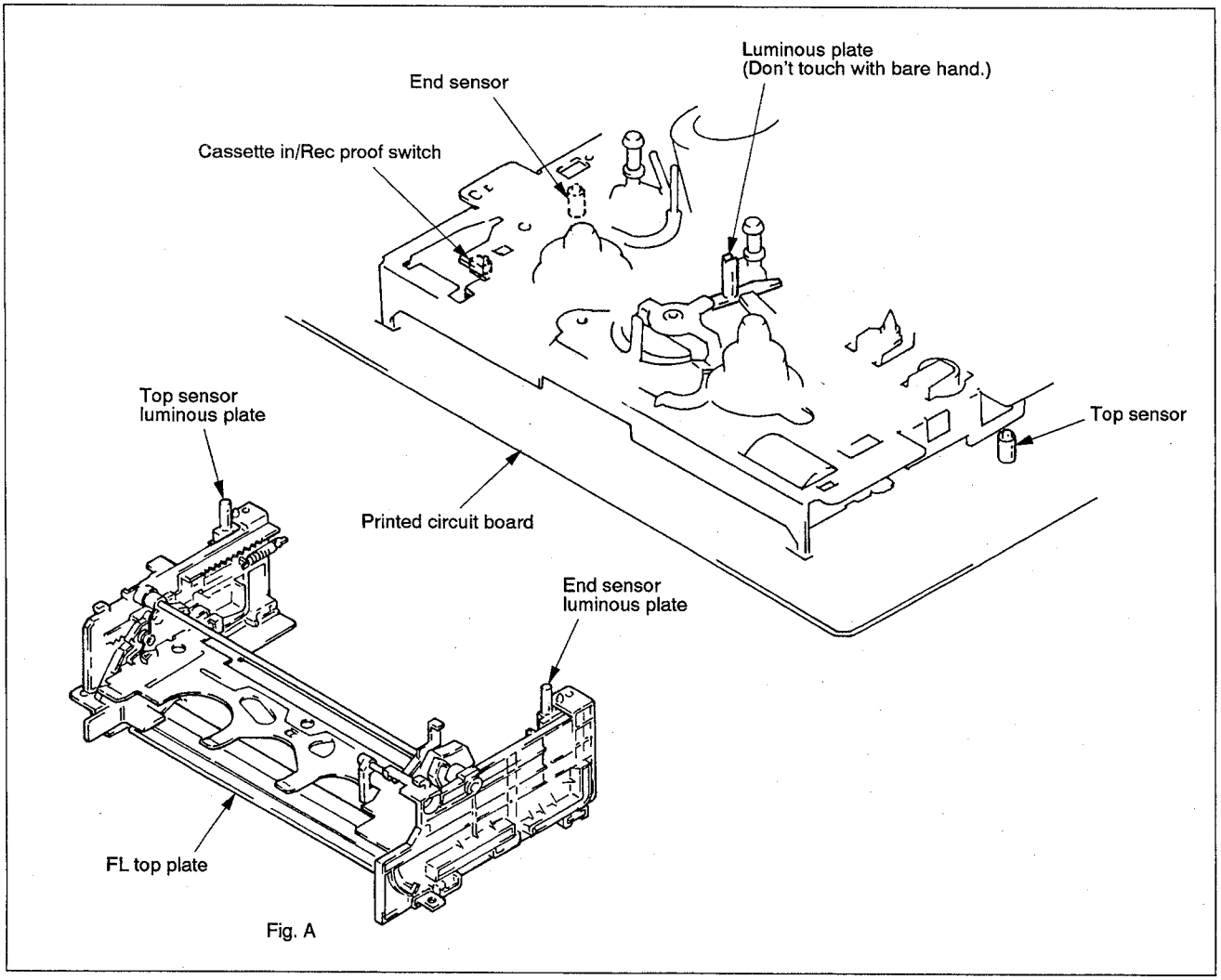


Fig. 1-4

2. PERIODIC CHECK AND REPLACEMENT

In order to obtain the best performance from this unit and make full use of its capabilities, and to extend the life of the unit and tapes, it is recommended that the following periodic checks and maintenance be performed.

* The following must be done after every repair regardless of how many hours the user has operated the machine.

2-1. CLEANING OF ROTATING HEAD DISK ASSEMBLY

1) Press a chamois cloth (Jig Ref. No. J-9) which has been dipped in cleaning fluid (Jig Ref. No. J-8) lightly against the rotating drum assembly, then do the cleaning by slowly rotating the rotating head disk by hand. (Never try to clean by using the motor to turn it.)
2) Never try to clean by moving the chamois cloth at a vertical angle to the head tip. There is a very great danger of damaging the head tip if this is done.

2-2. CLEANING OF THE TAPE MOVEMENT SYSTEM

1) Clean the surfaces which the tape contacts during its movement (tape guide, drum assembly surface, capstan, pinch roller, etc.) with a chamois cloth that has been dipped in cleaning fluid.

2-3. CLEANING THE DRIVE SYSTEM

1) Clean the driving parts with a cloth that been dipped in cleaning fluid.

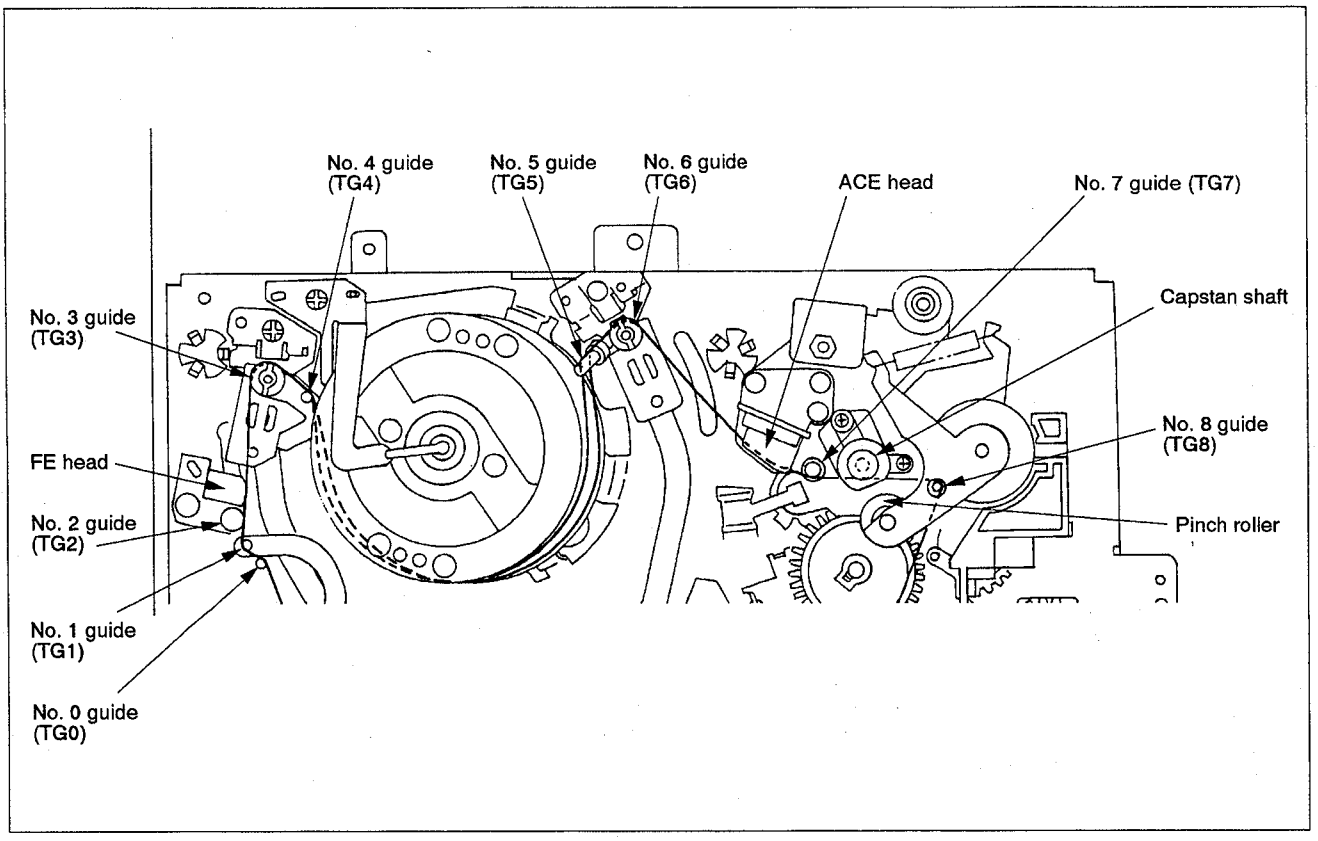


Fig. 2-1 Parts requiring cleaning

2-4. PERIODIC CHECK ITEMS

Perform the maintenance and check listed on the table below, according to users operating hours.

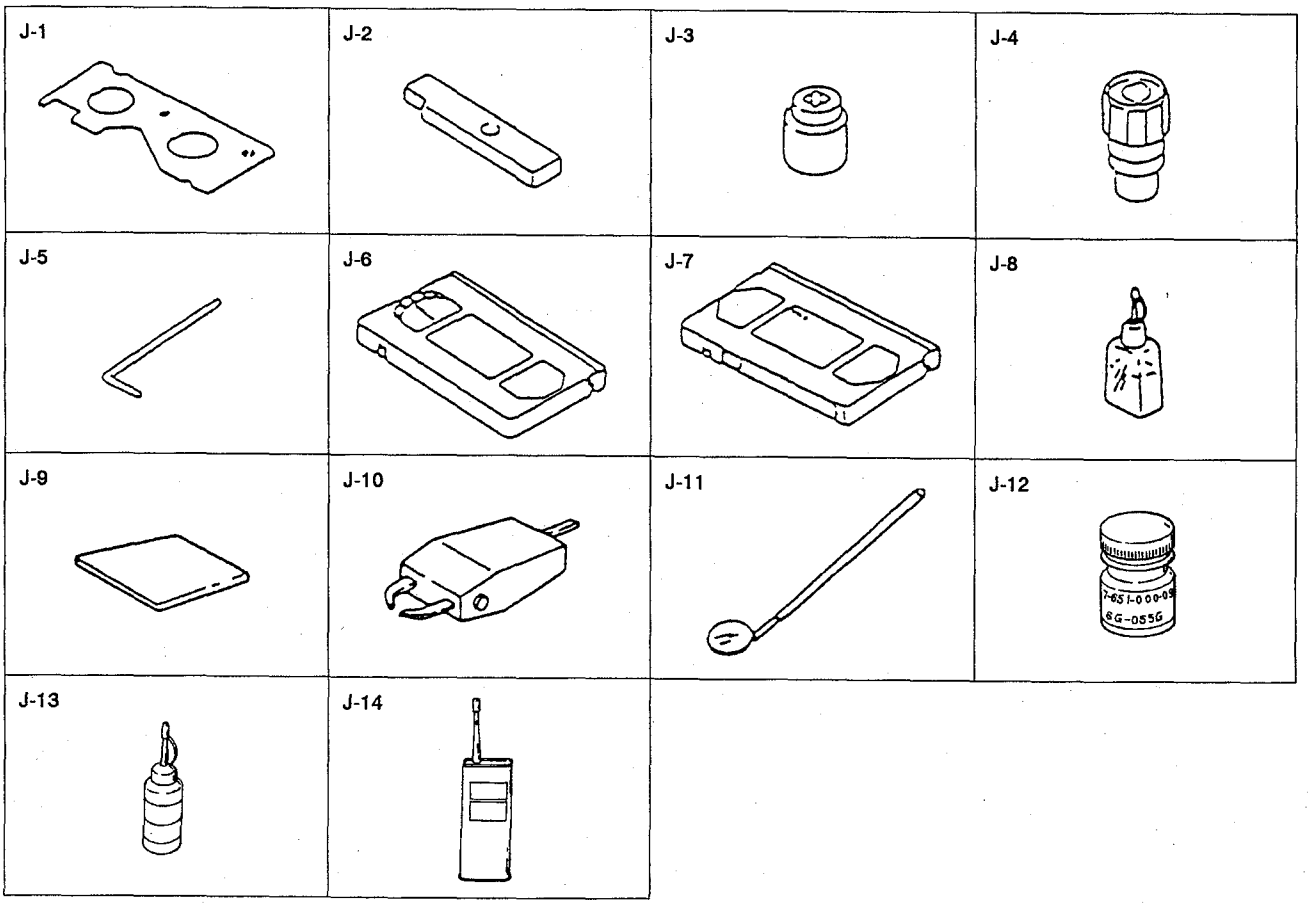
Maintenance & Check \ Operating Hours (H)		500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	Remarks
Tape Transportation System	Cleaning of tape transportation system	○	○	○	○	○	○	○	○	○	○	This cleaning must be done whenever a repair is made.
	Cleaning and degaussing of ACE assembly	○	○	○	○	○	○	○	○	○	○	
	Cleaning & degaussing of upper drum assembly	○	○	○	○	○	○	○	○	○	○	The life of the head varies, depending on operational conditions and method.
Performance Confirmation	Abnormal sound	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust or replace the section which causes abnormal sound.
	Measurement of FWD back tension	–	☆	–	☆	–	☆	–	☆	–	☆	Confirmation must be made according to 4-1-1. Specified value: adjust to 36 to 44 g•cm (when measured with torque cassette tape)
	Confirmation of brake system	–	☆	–	☆	–	☆	–	☆	–	☆	Confirmation must be made according to section.
	Confirmation of record & playback functions	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Perform the confirmation whenever repair is made.
	Measurement of forward torque	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust to 70 to 120 g•cm

○ Cleaning ☆ Confirmation

Note: On overhaul
When overhauling the unit, replace parts as indicated in the above table.

2-5. TOOLS AND FIXTURES REQUIRED FOR SERVICING

Ref No.	Name	Part No.	Carved Jig No.	Remarks
J-1	Master Plane	H-7099-279-H		Applicable to S-VHS
J-2	Reel Disk Height Jig	H-7099-038-H		
J-3	Torque Gauge Adaptor	H-7099-035-H		
J-4	0.93 mm Torque Gauge	H-7099-039-H		
J-5	Hex. Wrench	H-7099-202-H		
J-6	Torque Measurement Cassette VHT-063S	J-6082-011-A		For FWD & back tension torque measurement.
	Torque Measurement Cassette VHT-404S	J-6082-012-A		For CUE and review torque measurement.
J-7	Alignment Tape JVC-MH-1 (NTSC) 24HASF-2 (NTSC Hi-Fi) JVC-MH-2 (PAL) JVC-MH-4 (SECAM)	 H-7099-046-H H-7099-153-H H-7099-052-H H-7099-053-H		
J-8	Cleaning Fluid	Y-2031-001-0	———	
J-9	Chamois Leather	2-034-697-00	———	
J-10	Head Demagnetizer	Widely available	———	Demagnetize video heads and audio heads.
J-11	Dental Mirror (With handle) Dental Mirror (Mirror)	J-6080-029-A J-6080-030-1	SL-5052	Tape path and tape traveling adjustments or checks.
J-12	FLOIL SG-055G	7-651-000-09		
J-13	Diamond Oil NT-68	7-661-018-18		
J-14	Screw Lock G (1401B)	7-432-114-11		



3. MAINLY MECHANICAL PARTS REPLACEMENT

Notes:

- Refer to the service manual, "DISASSEMBLY" for removal of the cabinet and boards.
- On mounting, while referring to notes on mounting perform reversely in the removal order.
- When replacing greased parts, grease them in the same way.
- Do not oil, grease or touch with bare hands the surfaces contacts tape of guides and brake shoes.
- Install gears to engage each other.
- Basically, disassembling and assembling should be done in the unthreading-end condition.

3-1. FL BLOCK ASSEMBLY (Fig. 3-1)

1) Remove screws ①.
2) Remove FL block assembly ② in the arrow Ⓐ direction.

Note: Be careful not to damage claws on the bottom and front.

[Note on Mounting]

- First insert claws on the bottom and front not to damage.
- Engage FL slide plate to FL driving gear with slightly sliding FL slide plate. (Fig. A)
- Keep clean top sensor and end sensor luminous plates. (Refer to 1-3.)

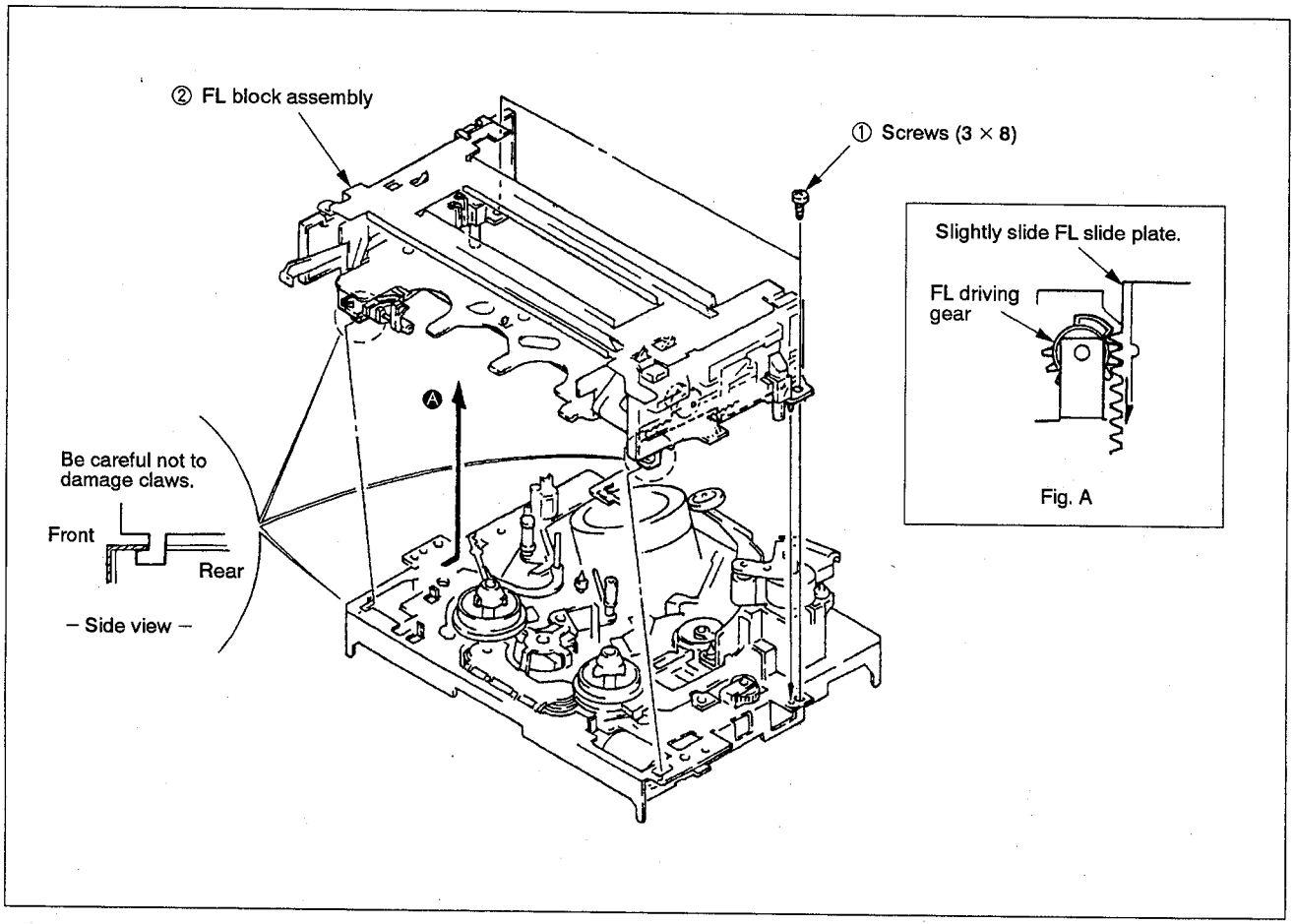


Fig. 3-1

3-2. DRUM ASSEMBLY (Fig. 3-2)

1) Remove screw ①.
2) Remove ground shaft assembly ② not to touch its tip with bare hand or tools.
3) Remove screws ③ to remove drum assembly ④.

[Note on Mounting]

- Don't touch head chips ⑤ and ground shaft assembly ④ with bare hand or tools.
- Keep clean the surface contacts tape of drum assembly ④.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

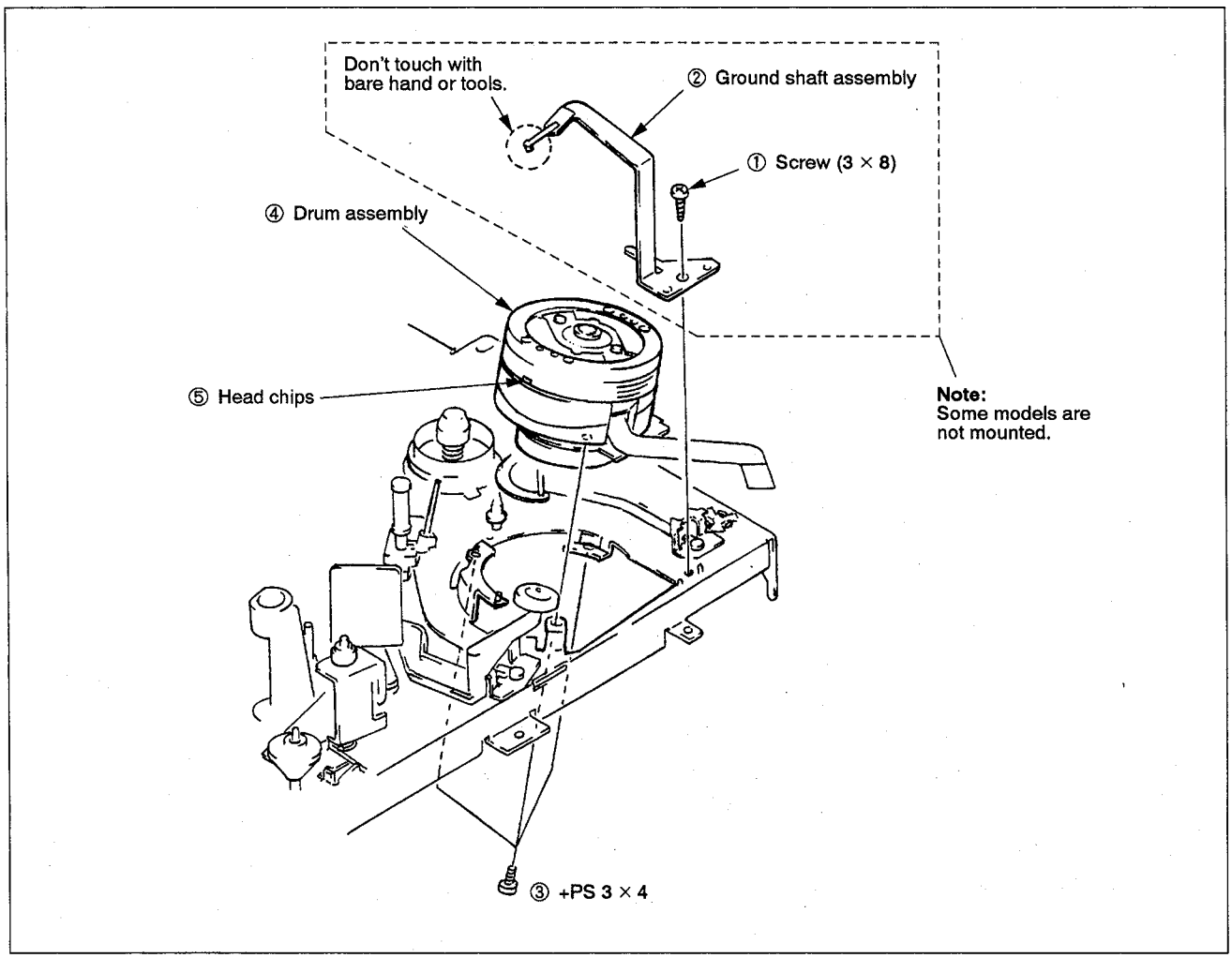

Don't touch with bare hand or tools.
② Ground shaft assembly
① Screw (3 × 8)
④ Drum assembly
⑤ Head chips
Note:
Some models are not mounted.
③ +PS 3 × 4

Fig. 3-2

3-3. TIMING BELT (Fig. 3-3)

1) Remove screw ① to remove tension vehicle arm assembly ②.
2) Remove timing belt ③.

[Note on Mounting]

- Tighten screw ① while pressing tension vehicle arm in the arrow Ⓐ direction.

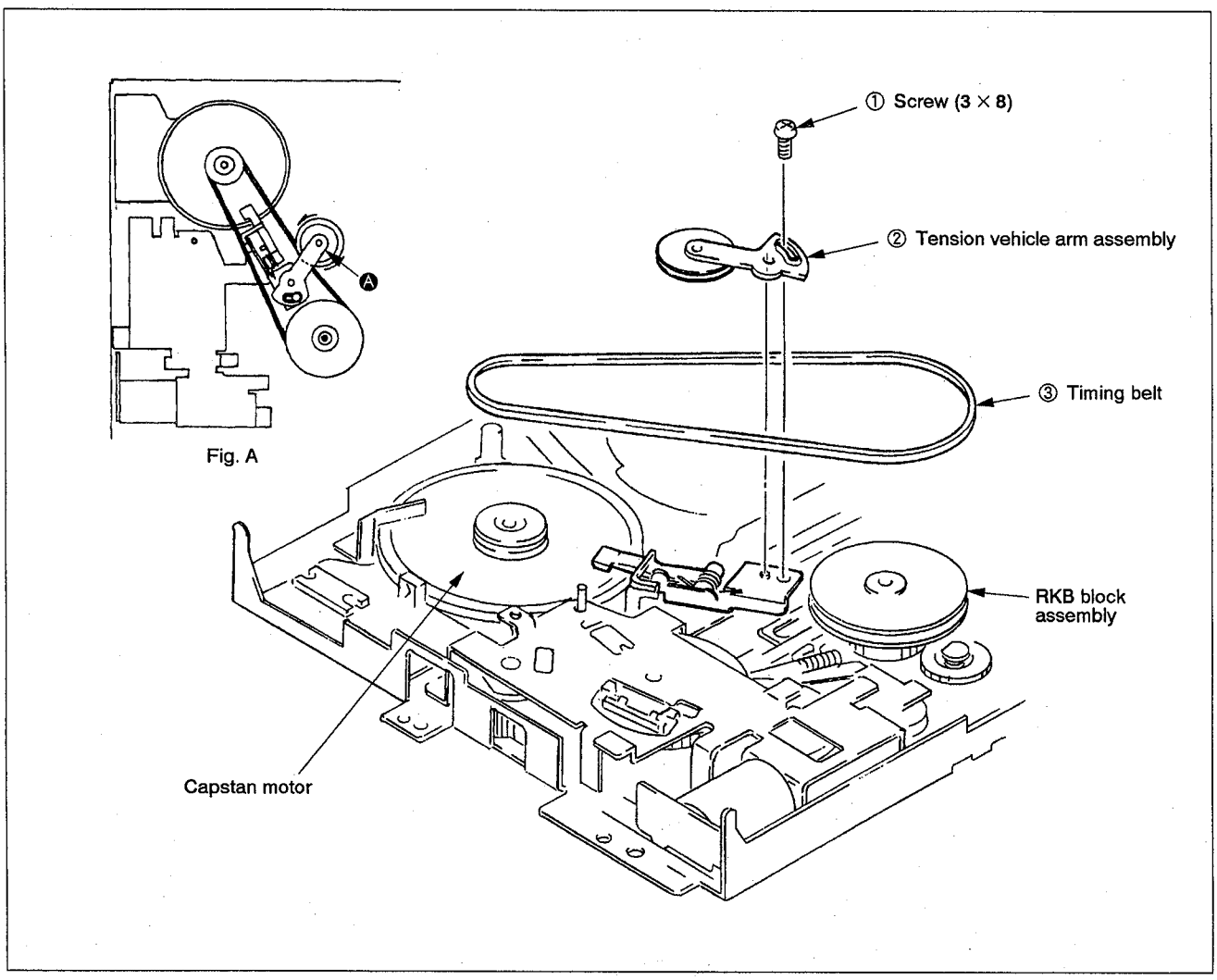


Fig. 3-3

3-4. CAP BRAKE ASSEMBLY (Fig. 3-4)

1) Remove tension vehicle arm assembly. (Refer to 3-3)
2) Remove torsion coil spring ① from portion Ⓐ to remove CAP brake assembly.

[Note on Mounting]

- Mount torsion coil spring ① to CAP brake assembly ② in the order Ⓐ and Ⓑ. (Fig. A)
- Put the fulcrum of CAP brake assembly ② to CAP brake shaft ③ and the tip of torsion coil spring to Ⓒ.
- Don't touch brake shoe Ⓓ with bare hand.

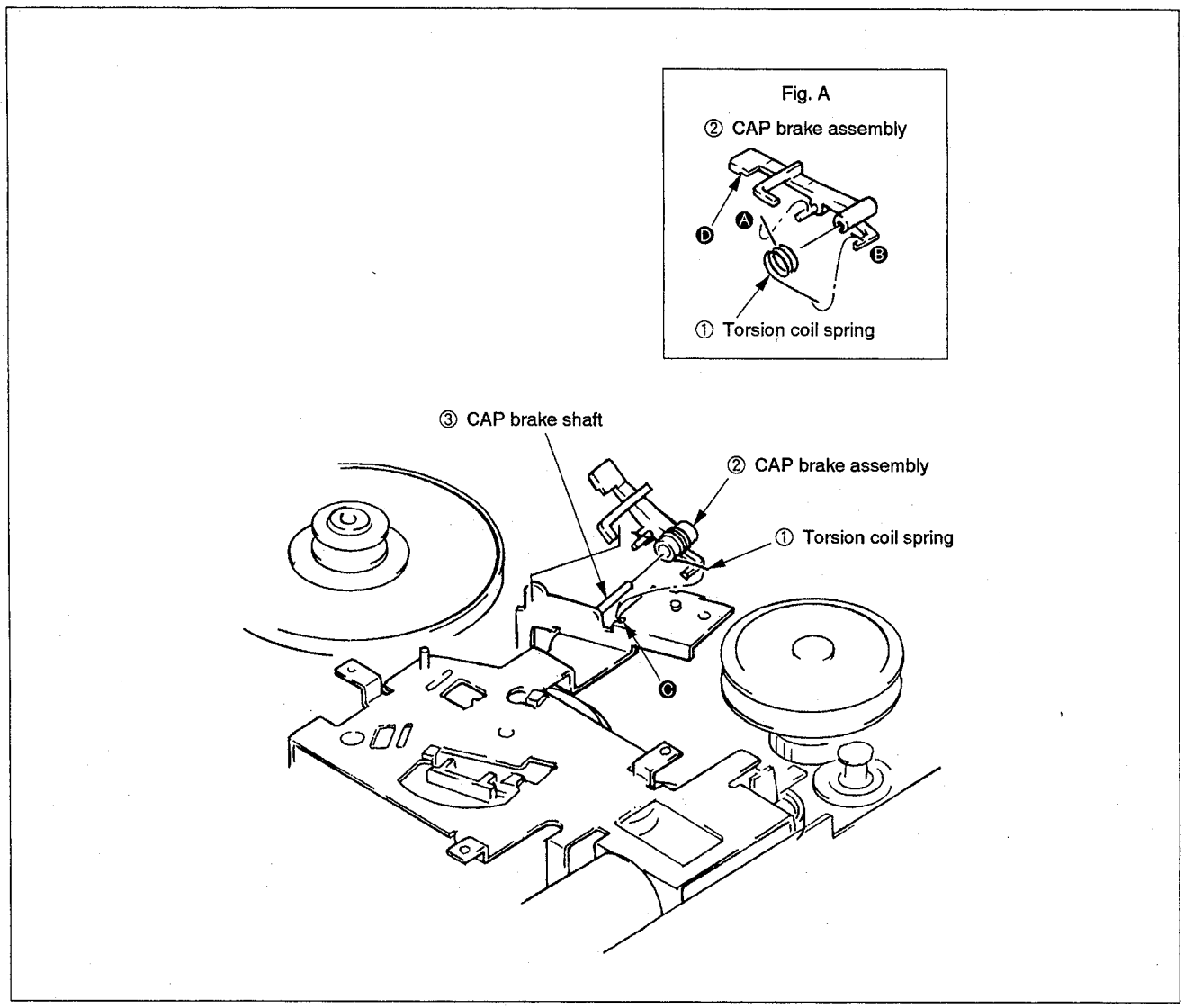


Fig. 3-4

3-5. TG2 ROLLER, FE HEAD ASSEMBLY (Fig. 3-5)

1) Remove claw Ⓐ to pull out TG2 roller ①.
2) Remove screw ② to pull out FE head assembly.

[Note on Mounting]

- Keep clean the surface contacts tape of TG2 roller ①.

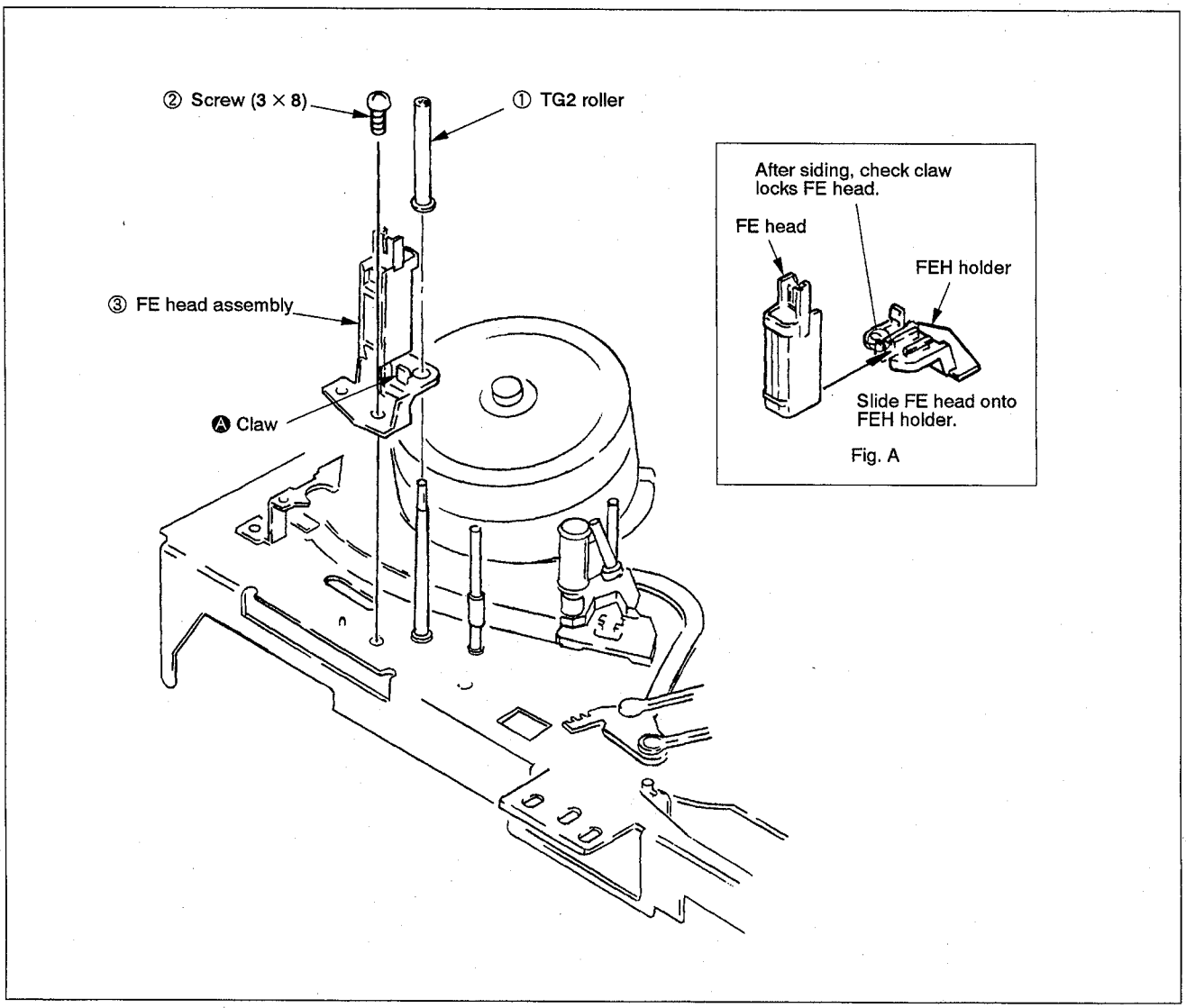


Fig. 3-5

3-6. PINCH PRESS BLOCK ASSEMBLY, ELEVATOR GEAR (Fig. 3-6)

1) Remove E ring ① to pull out pinch press block assembly ②.
2) Remove lid opener ③ by pressing claw Ⓐ in the arrow Ⓑ direction.
3) Pull out elevator gear ④.

[Note on Mounting]

- Apply grease FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portions.
- Be sure to match the phase Ⓒ between elevator gear ④ and press gear ⑤ on mounting elevator gear ④.

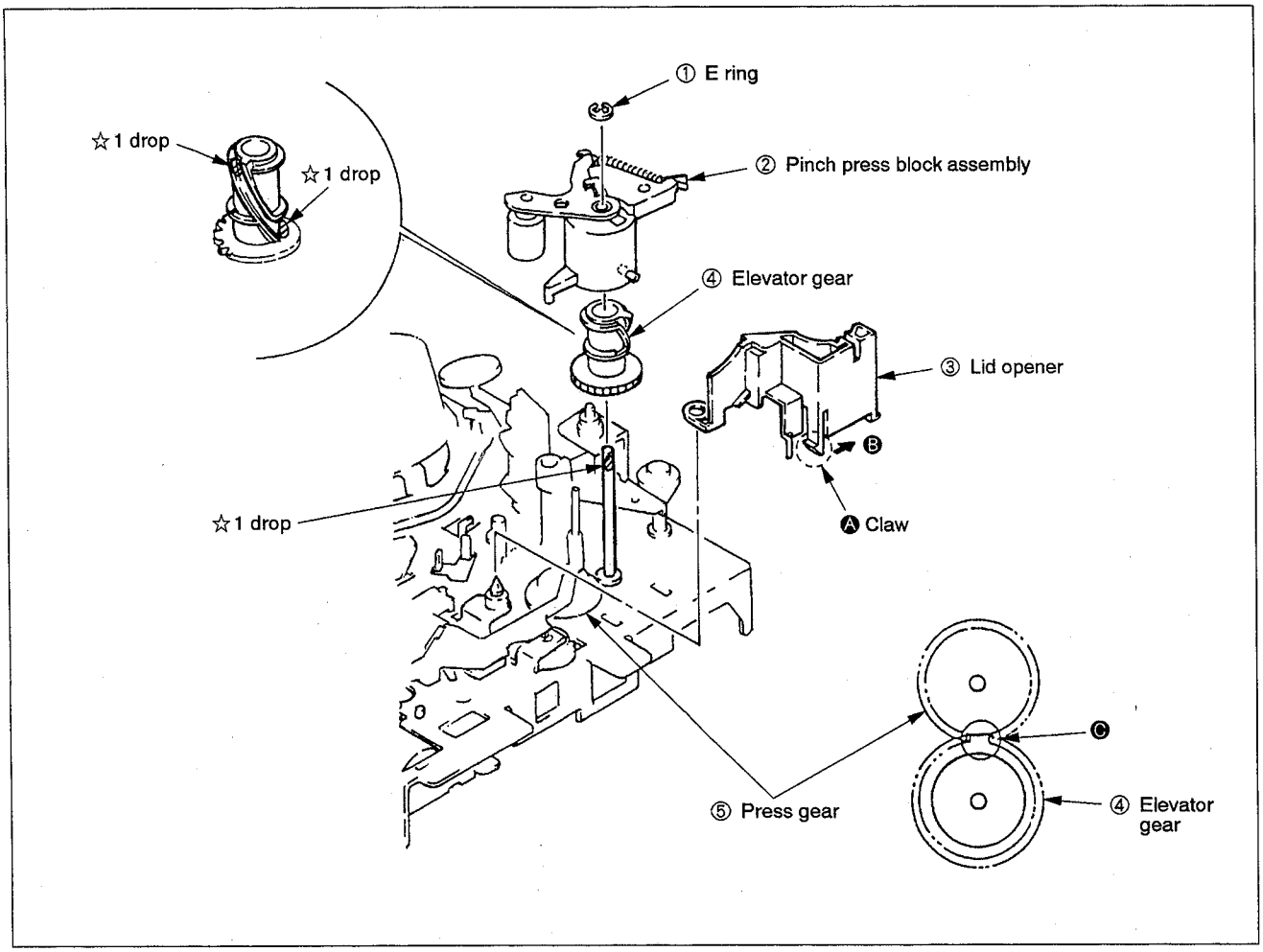


Fig. 3-6

3-7. ACE BLOCK ASSEMBLY (Fig. 3-7)

1) Move torsion coil spring (ACE) ① in the arrow Ⓐ direction.
2) Remove ACE adjustment screw ②.
3) Remove AC height adjustment nut ③ to pull out ACE block assembly ④.

[Note on Mounting]

- Keep clean the surface contacts tape of ACE block assembly ④.
- Be sure to hang torsion coil spring (ACE) ① in the arrow Ⓑ direction.
- Set ACE adjustment screw ② to the height as shown in Fig. A.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.
- After adjustment apply Screw Lock G (1401B) (Jig Ref. No. J-14) at ☆ marked portion.

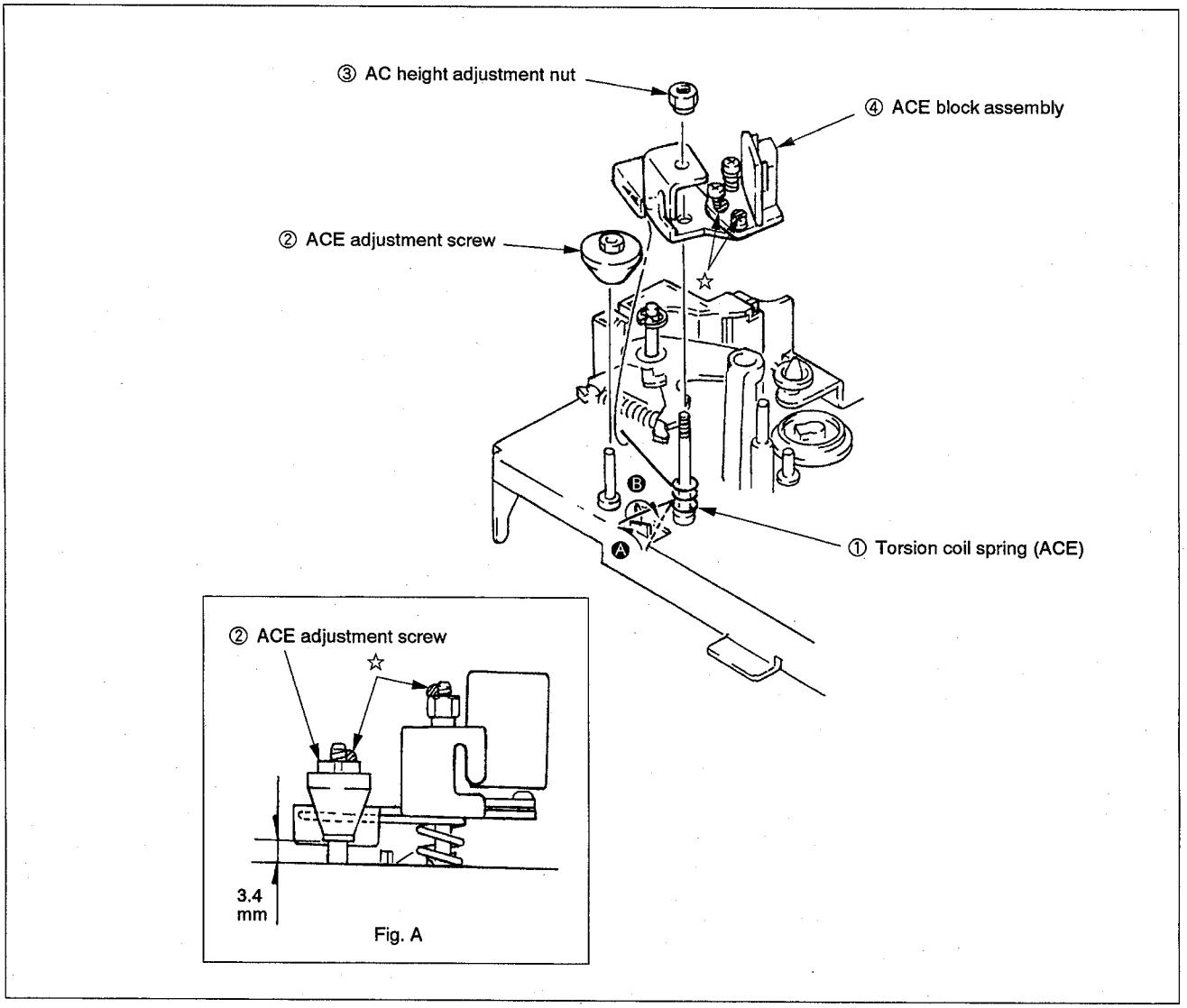


Fig. 3-7

3-8. TG3, TG6 GUIDE ROLLER ASSEMBLIES (Fig. 3-8)

1) Loosen screw ① and pull out. TG3 guide roller assembly ② by turning it in the arrow Ⓐ direction.
2) Loosen screw ③ and pull out TG6 guide roller assembly ④ by turning it in the arrow Ⓑ direction.

[Note on Mounting]

- Keep clean the surface contacts tape of TG3 and TG6 guide roller assemblies ②, ④.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

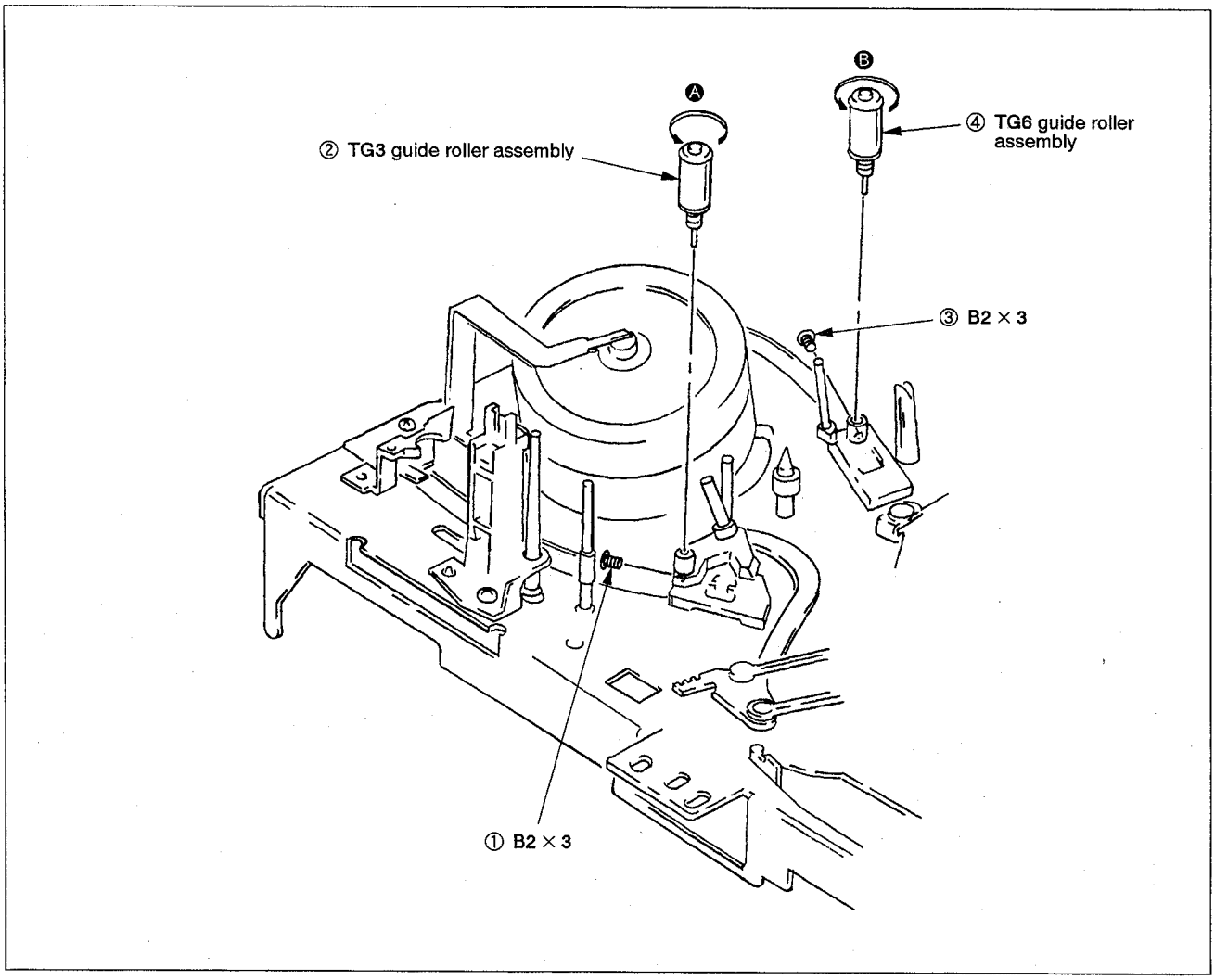


Fig. 3-8

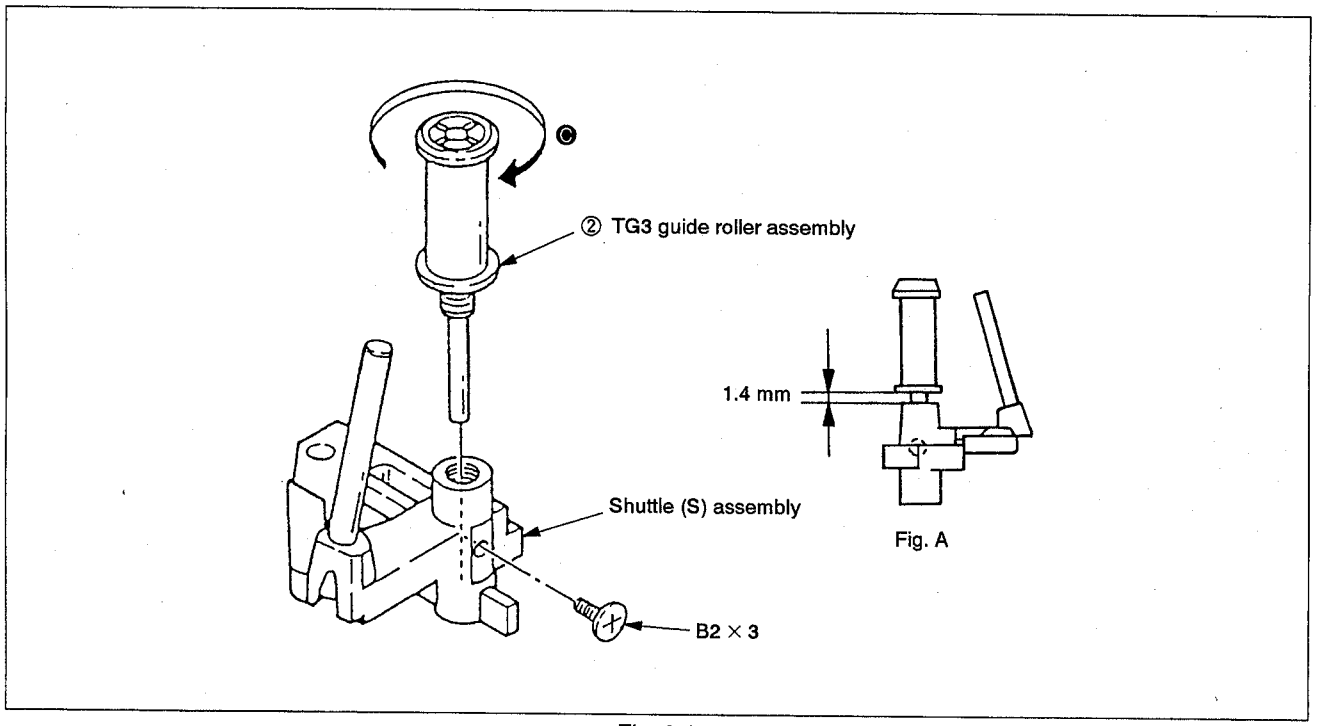


Fig. 3-9

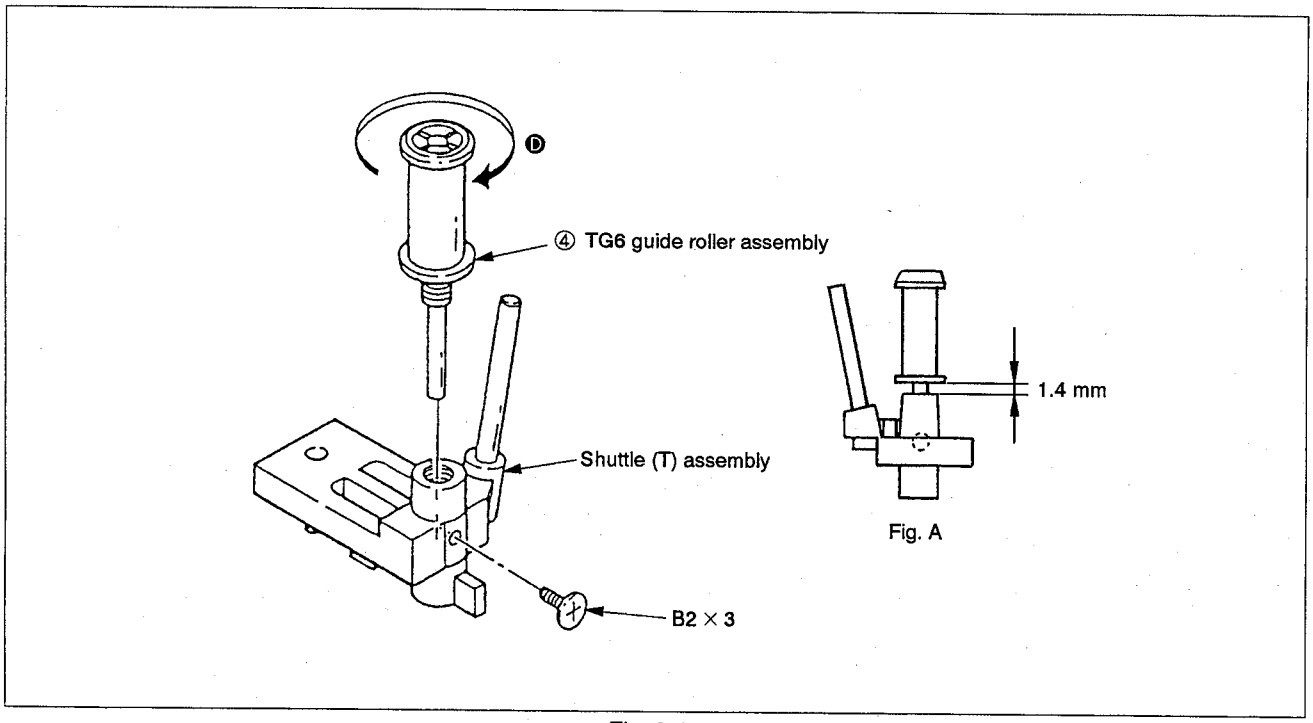


Fig. 3-10

3-9. CAPSTAN MOTOR (Fig. 3-11)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove screws ① to pull out capstan motor ②.

[Note on Mounting]

- Keep clean the surface contacts tape of capstan motor ②.
- On tightening screws ①, first tighten screw A temporarily, next tighten screws in the order B to C to A.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

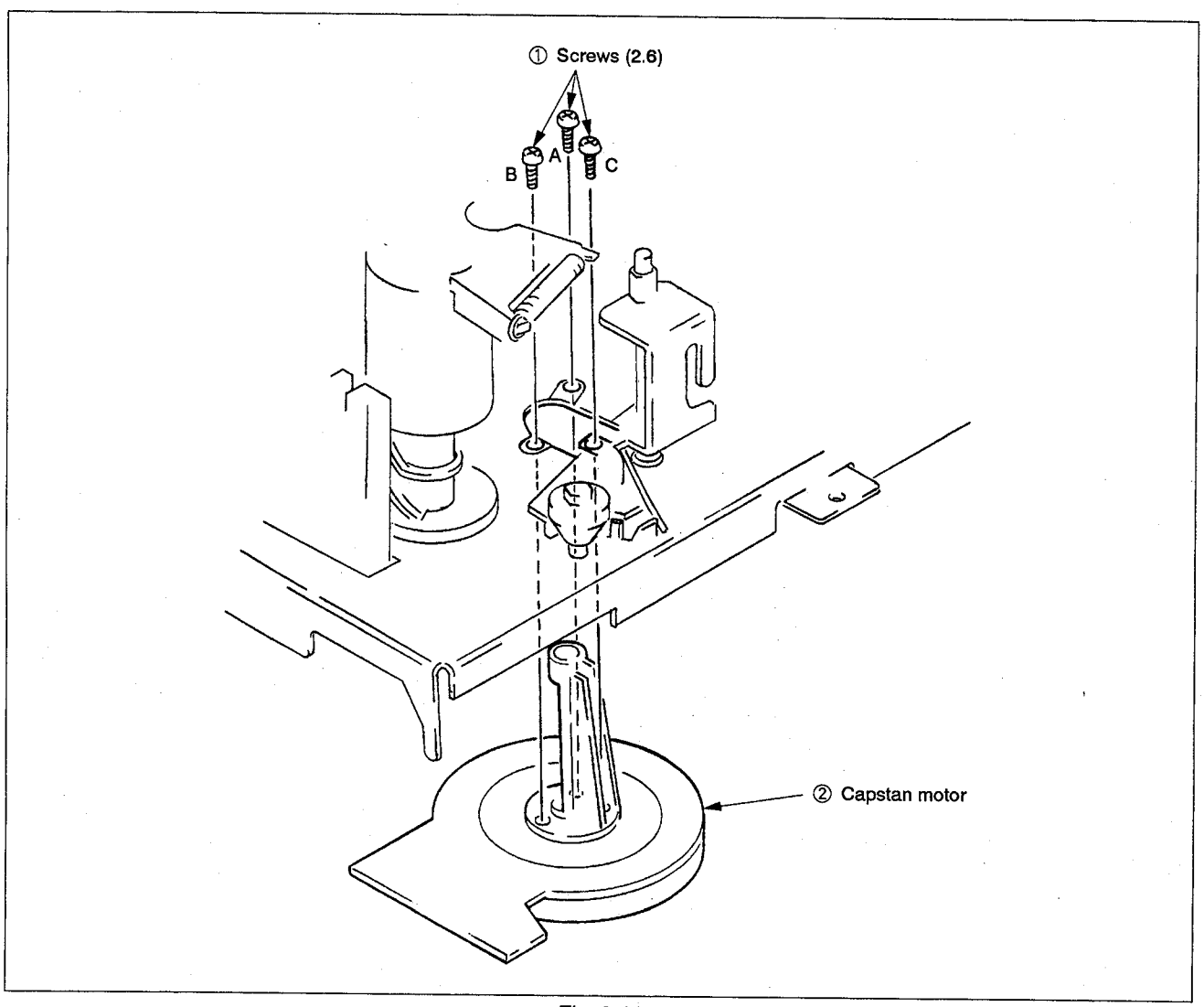


Fig. 3-11

3-10. MAIN BRAKE ASSEMBLIES S AND T (Fig. 3-12)

1) Remove tension spring ①.
2) Remove stopper washer (2) ② to remove neutrality arm ③.
3) Remove pendulum compulsion arm ④ and tension coil spring ⑤.
4) Remove stopper washer (2) ⑥ to remove main brake S assembly ⑦.
5) Remove stopper washer (2) ⑧ to remove main brake T assembly ⑨.

[Note on Mounting]

- Don't touch brake shoes Ⓐ and Ⓑ with bare hand.
- Apply FLOIL FG-055G (Jig Ref. No. J-12) to ☆ marked portions.

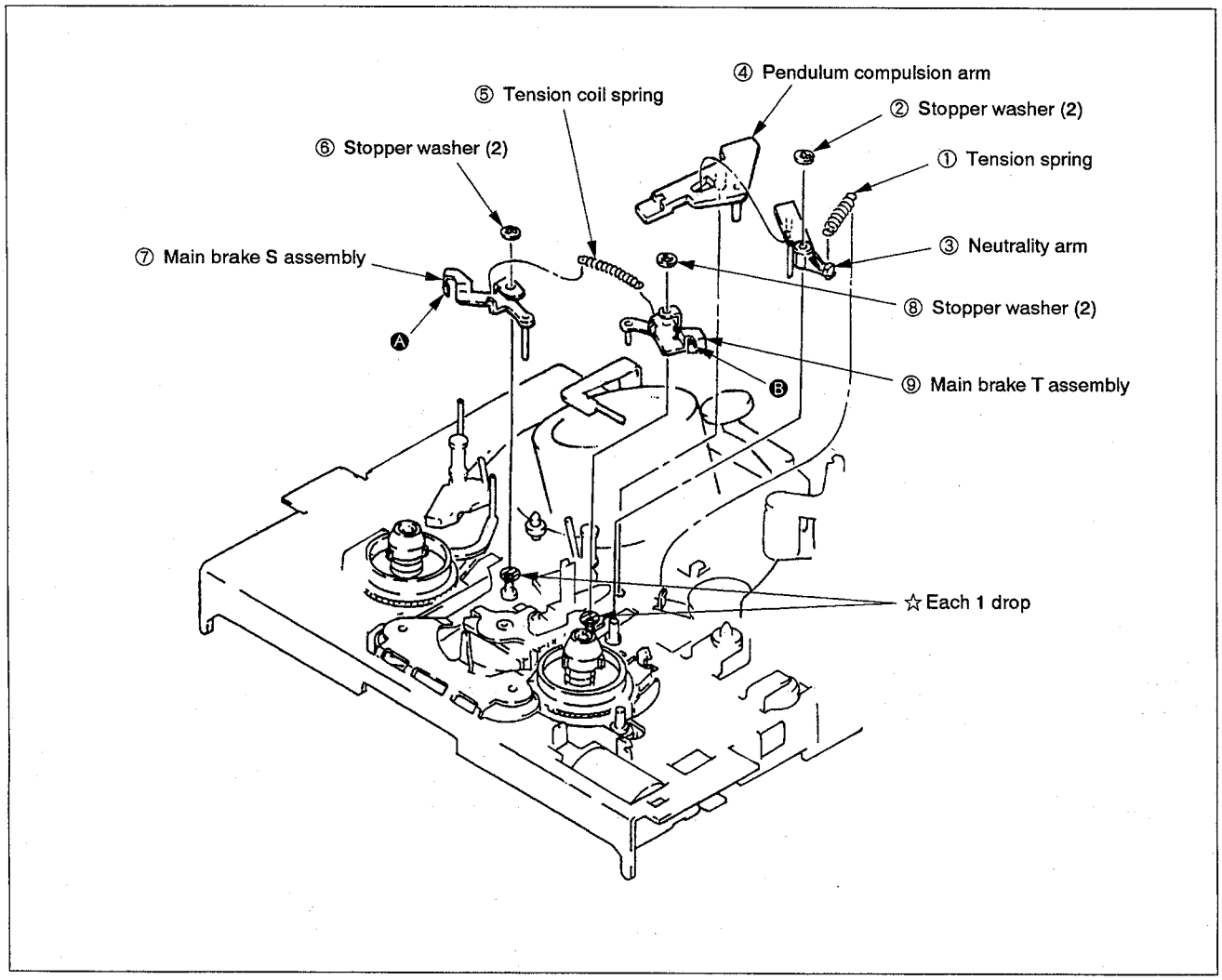


Fig. 3-12

3-11. SOFT BRAKE T ASSEMBLY (Fig. 3-13)

1) Remove pinch press block assembly. (Refer to 3-6.)
2) Remove lid opener ① carefully not to damage claw Ⓐ.
3) Remove tension spring ② from side Ⓑ to pull out soft brake T assembly ③.

[Note on Mounting]

• Don't touch brake shoes Ⓒ with bare hand.

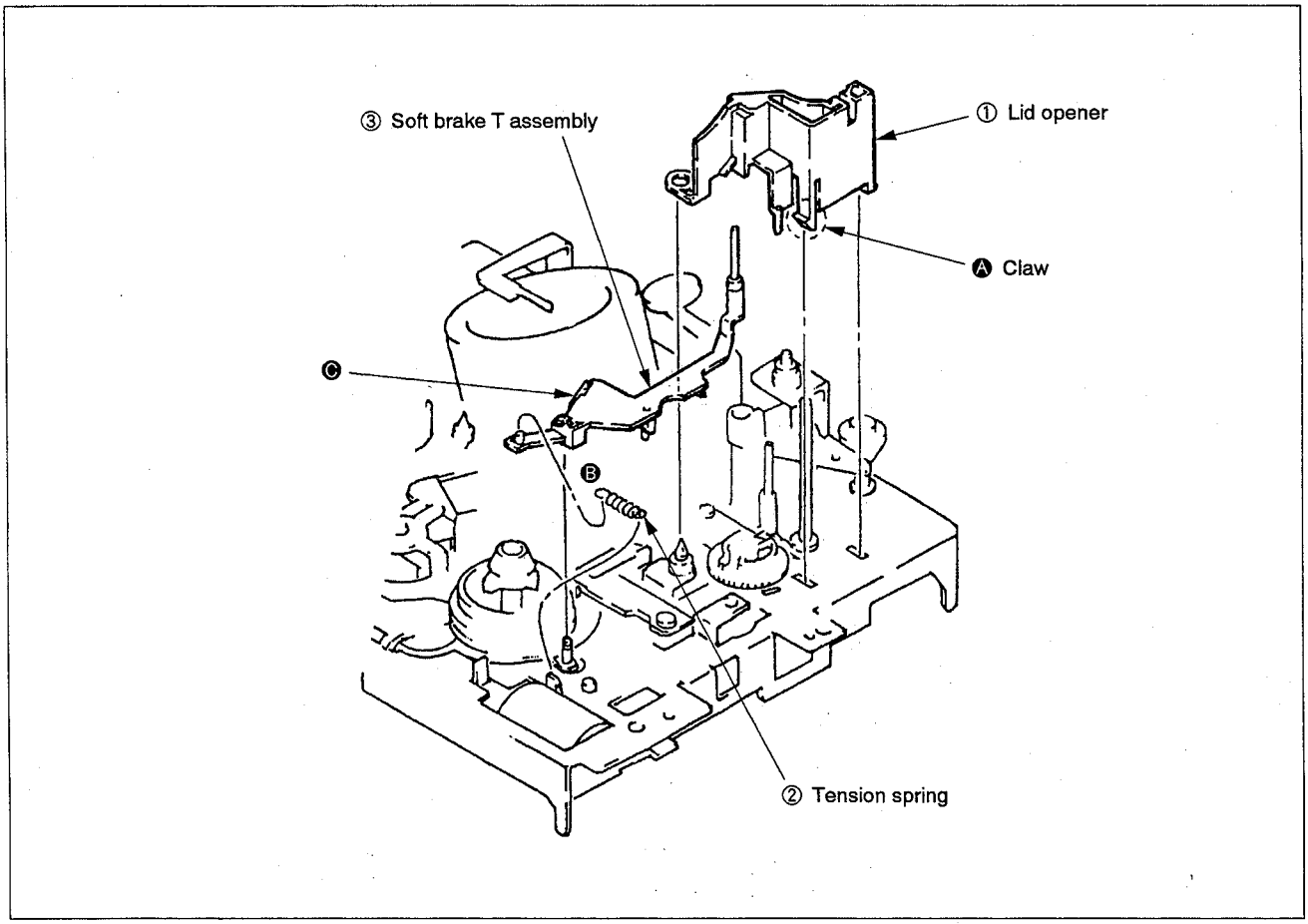


Fig. 3-13

3-12. RVS BRAKE ARM ASSEMBLY, REEL TABLE (T) ASSEMBLY (Fig. 3-14)

1) Remove main brake T assembly. (Refer to 3-10.)
2) Remove soft brake T assembly. (Refer to 3-11.)
3) Remove tension coil spring ① in the order Ⓐ to Ⓑ.
4) Remove RVS brake arm assembly ②.
5) Remove stopper washer (2) ③ to pull out reel table (T) assembly ④.

[Note on Mounting]

- Apply one drop of Diamond Oil NT-68 (Jig Ref. No. J-13) to ☆ marked portion before mounting reel table (T) assembly ④. (Fig. A)
- Don't touch the hatched portion on reel table (T) assembly ④ and brake shoe Ⓒ of RVS brake arm assembly ② with bare hand.

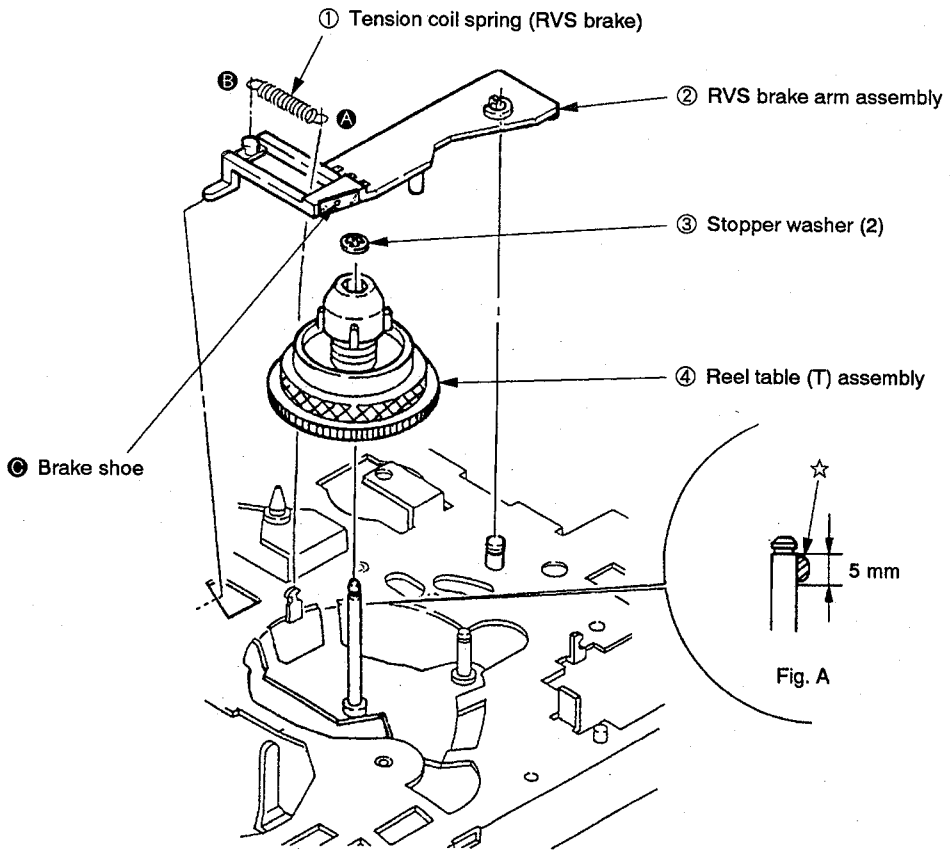


Fig. 3-14

3-13. TG8 ASSEMBLY (Fig. 3-15)

1) Remove TG8 retainer ① to pull out TG8 assembly ②.

[Note on Mounting]

- Apply FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portion.
- Keep clean the surface contacts tape of TG8 assembly ②.
- Be careful not to change the shape of TG8 retainer ①.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

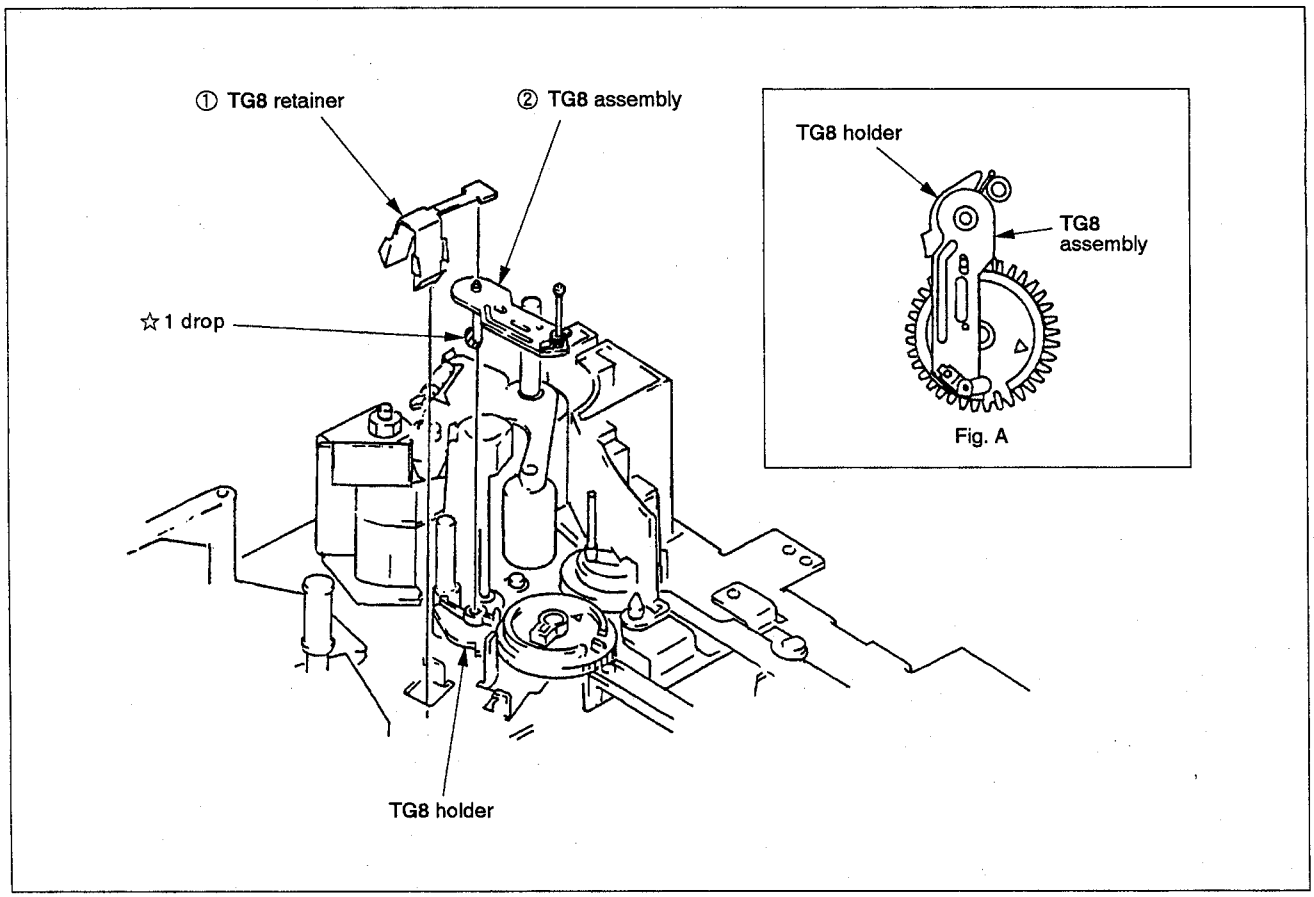


Fig. 3-15

3-14. TG8 HOLDER (Fig. 3-16)

1) Remove TG8 assembly. (Refer to 3-13)
2) Pull out TG8 holder ①.

[Note on Mounting]

• Be careful about the direction of TG8 holder ①. (Ⓐ of Fig. A)

[Adjustment after Mounting]

• 4-1. Tape path adjustment.

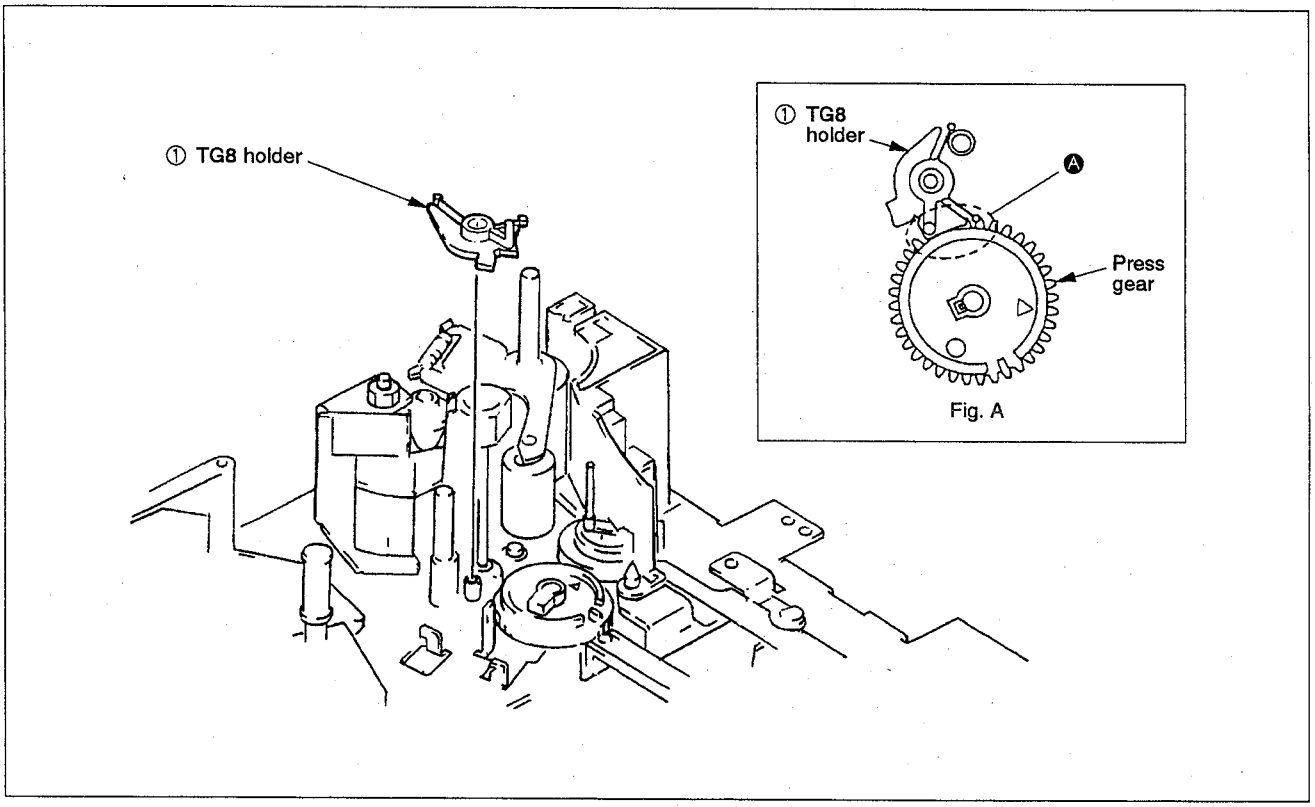


Fig. 3-16

3-15. TG8 AND PRESS GEARS (Fig. 3-17)

1) Remove pinch press block assembly. (Refer to 3-6.)
2) Remove soft brake T assembly. (Refer to 3-11.)
3) Remove TG8 assembly. (Refer to 3-13.)
4) Remove TG8 holder. (Refer to 3-14.)
5) Pull out TG8 gear ① or press gear ②.

[Note on Mounting]

- Adjust the holes on gears to the holes on chassis. (Fig. A)
- Adjust the arrows carved on gears each other. (Fig. A)

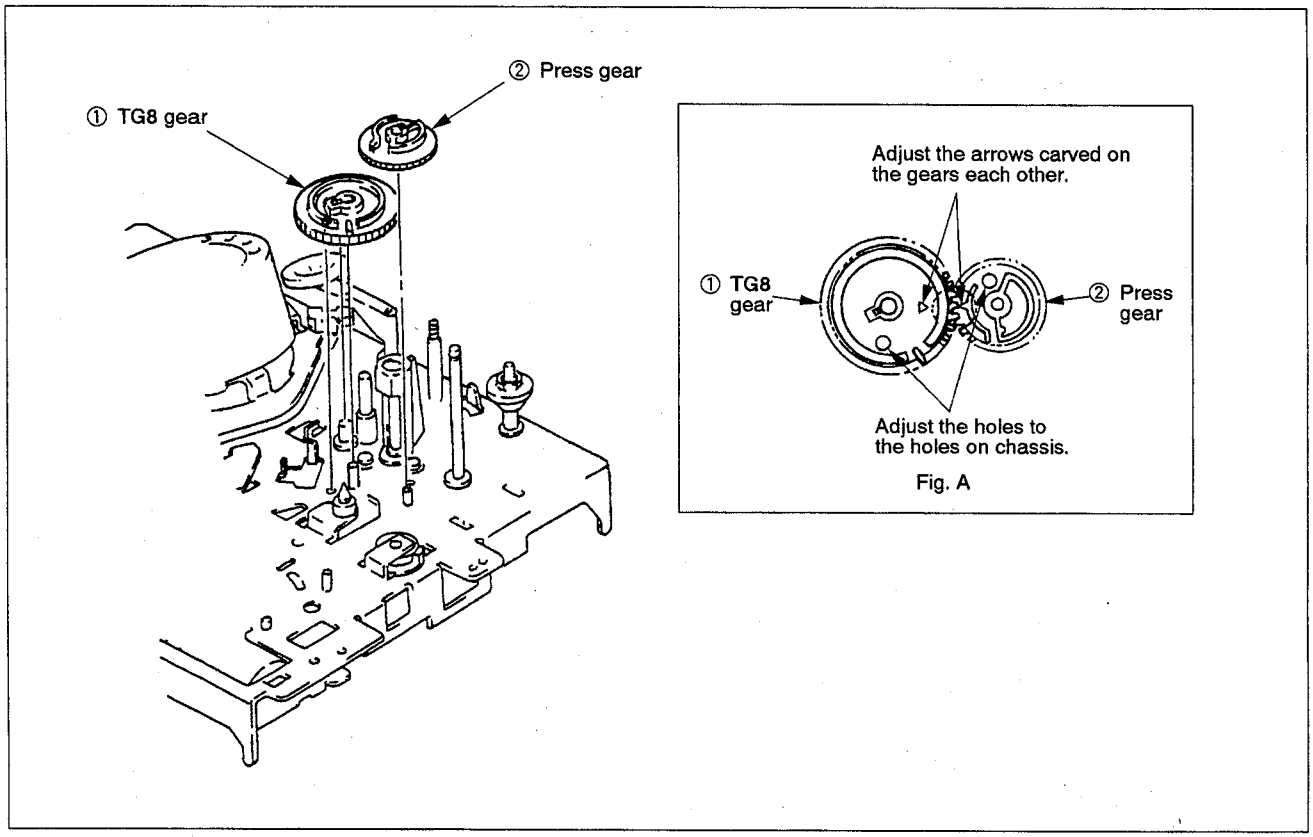

② Press gear
① TG8 gear
Adjust the arrows carved on the gears each other.
① TG8 gear
② Press gear
Adjust the holes to the holes on chassis.
Fig. A

Fig. 3-17

3-16. CAM MOTOR CHASSIS BLOCK ASSEMBLY, UPPER/LOWER COMMUNICATION GEAR (Fig. 3-18)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove screws ① to remove cam motor chassis assembly ②.
4) Pull out upper/lower communication gear ③.

[Note on Mounting]

- First, check main slider ④ slides fully in the arrow Ⓔ direction.
- Set rotary encoder switch position to "E" seen from the window of cam motor chassis. (Fig. A)
- Tighten screws ① in the order Ⓐ to Ⓑ to Ⓒ to Ⓓ.

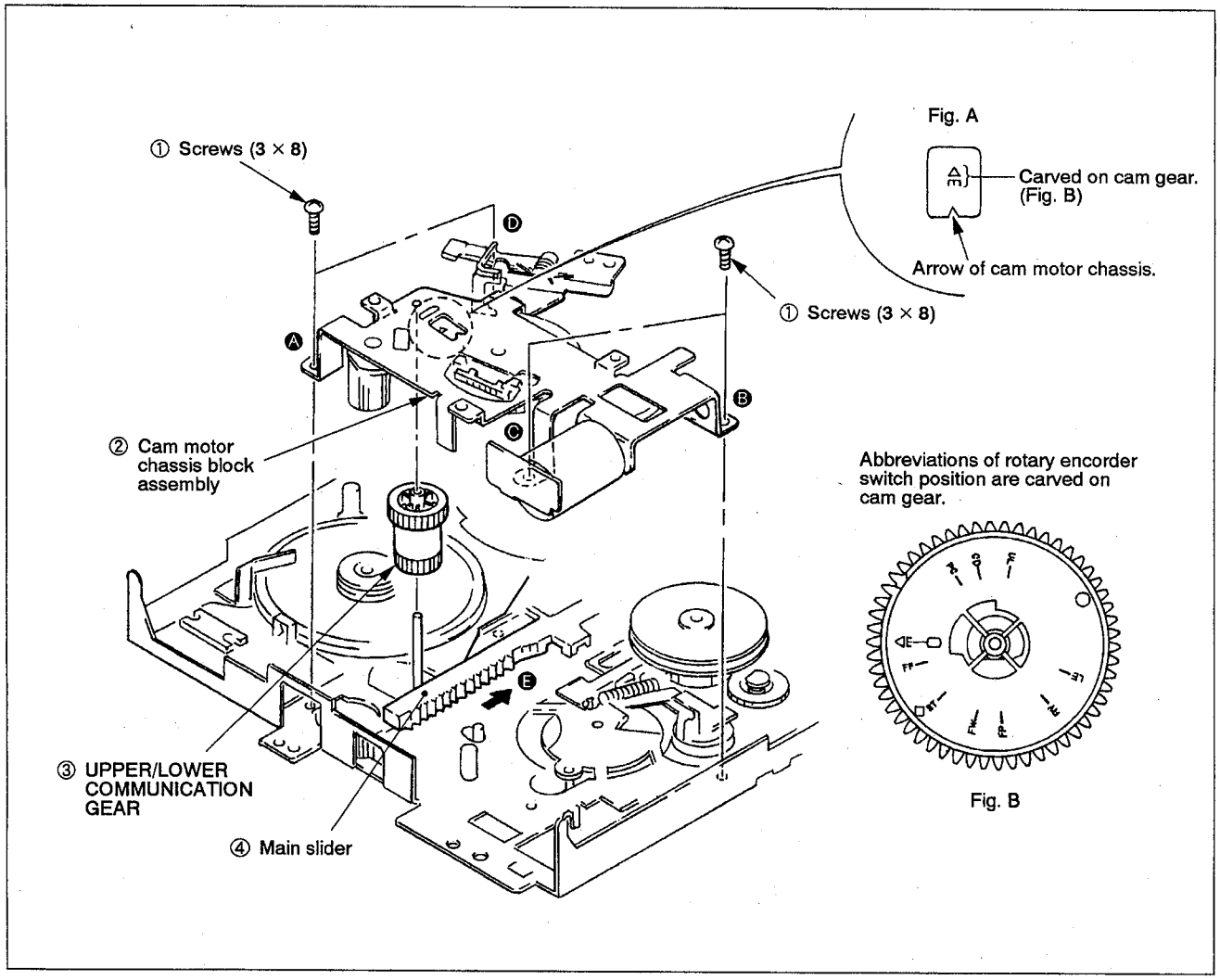


Fig. 3-18

3-17. ROTARY ENCODER SWITCH (Fig. 3-19)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly (Refer to 3-15.) and turn upside on the bottom.
4) Remove stopper washer (2) ① to pull out worm wheel ②.
5) Remove stopper washer (2) ③ to pull out cam gear ④.
6) Pull out FL driving gear ⑤ and rotary encoder switch ⑥.

[Note on Mounting]

- Apply FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portions. (Fig. 3-19, A)
- Adjust the hole Ⓐ to the hole on cam motor chassis. (Fig. B)
- Adjust the holes Ⓑ and Ⓒ to the hole on cam motor chassis. (Fig. C)

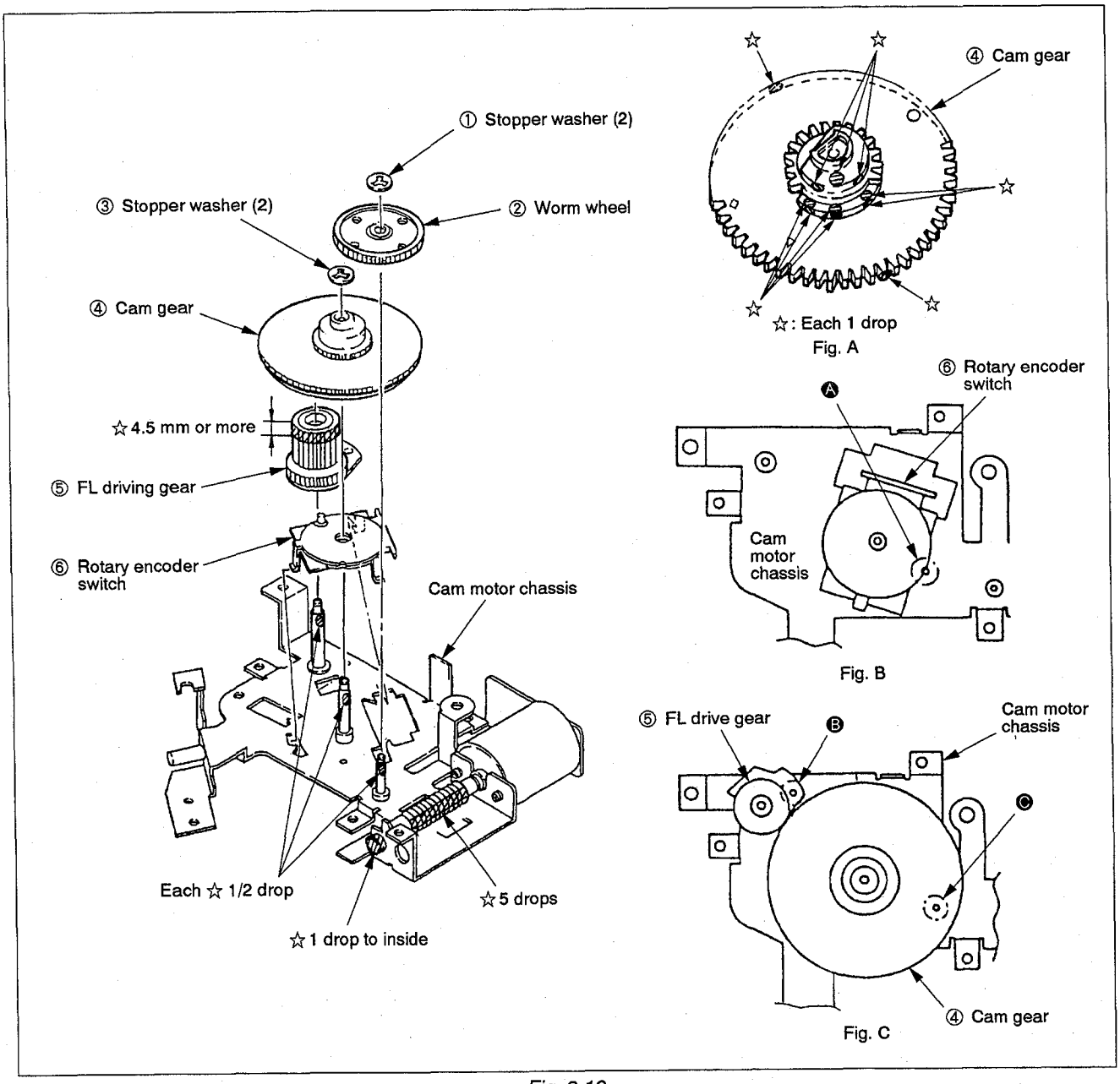


Fig. 3-19

3-18. MAIN SLIDER (Fig. 3-20)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly. (Refer to 3-16.)
4) Remove screw ① to remove retainer ②.
5) Pull out main slider ③.

[Note on Mounting]

- Apply FLOIL SG-055G (Jig Ref. No. J-12) as shown in Fig. A.
- At the last, slide main slider fully in the arrow Ⓐ direction.

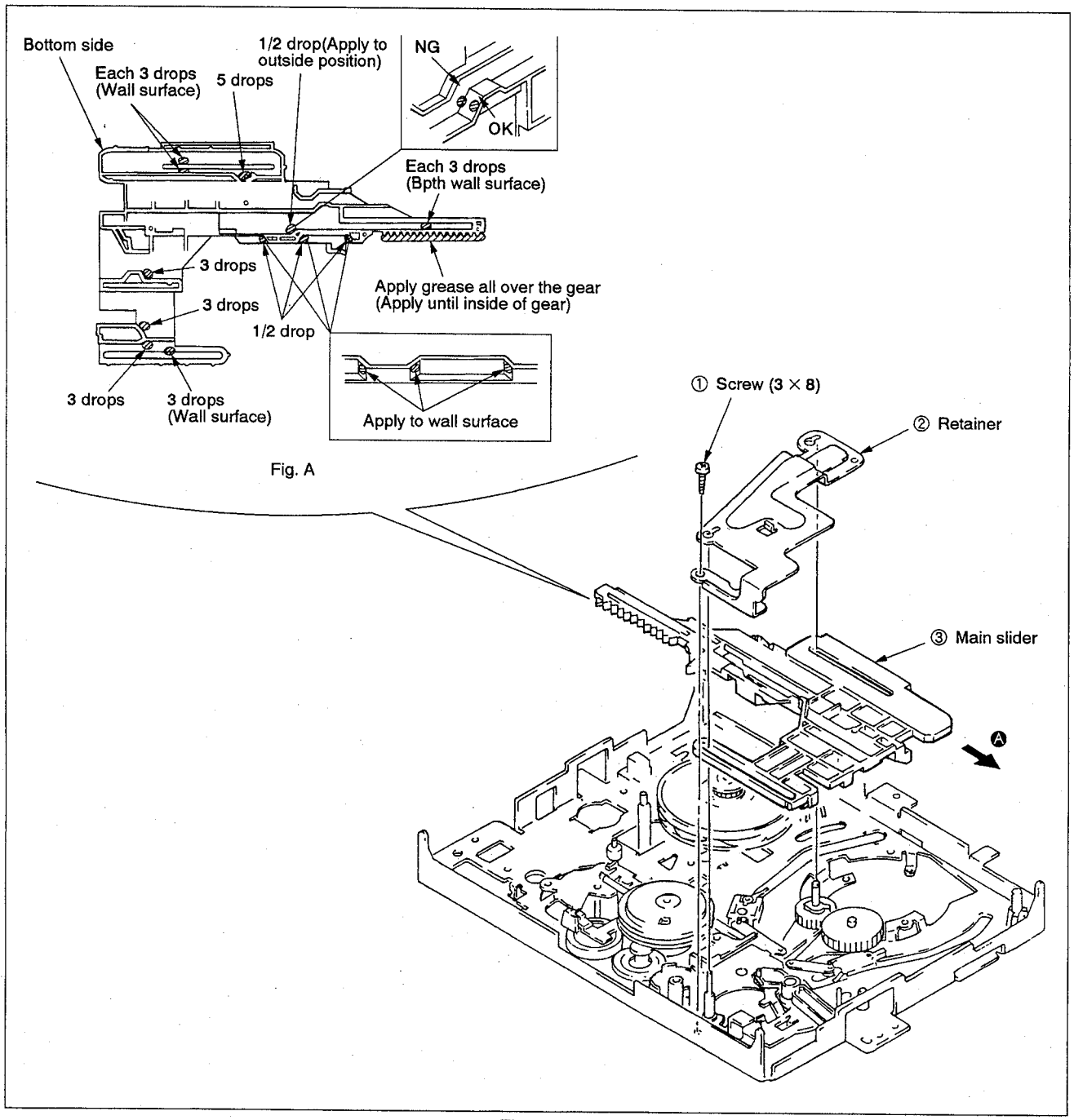


Fig. 3-20

3-19. SHUTTLE T BLOCK AND LOADING GEAR T BLOCK ASSEMBLIES (Fig. 3-21)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly. (Refer to 3-16.)
4) Remove main slider. (Refer to 3-18.)
5) Remove screw ① to remove loading leaf (T) spring ② and shuttle T block assembly ③.
6) Pull out loading gear T block assembly ④.

[Note on Mounting]

- Adjust the phase Ⓐ between loading gear (T) and loading gear (S). (Fig. A)
- Keep clean the surface contacts tape of shuttle T block assembly ③.

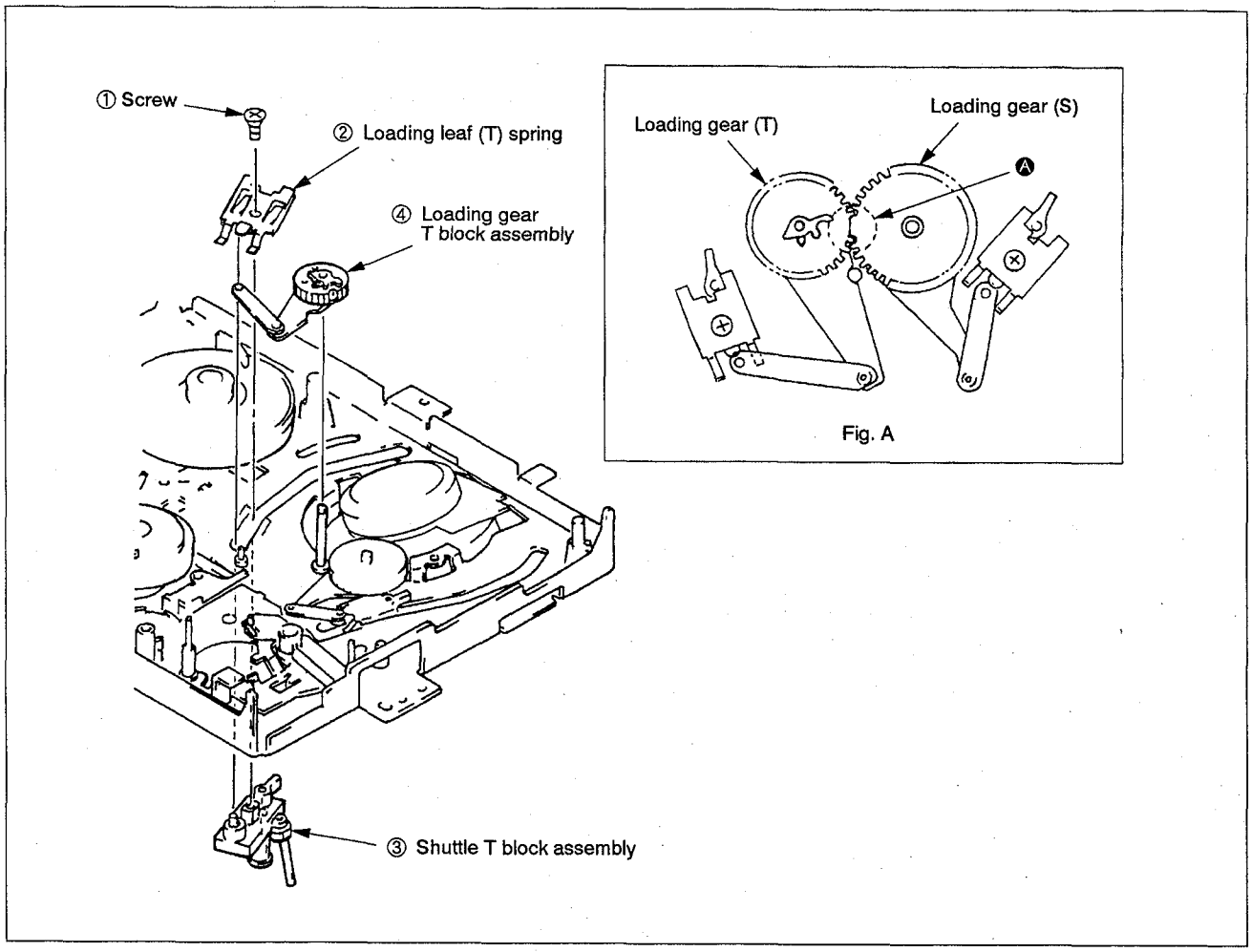


Fig. 3-21

3-20. SHUTTLE S BLOCK AND LOADING GEAR S BLOCK ASSEMBLIES (Fig. 3-22)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly. (Refer to 3-16.)
4) Remove main slider. (Refer to 3-15.)
5) Remove screw ① to remove loading leaf (S) spring ② and shuttle S block assembly ③.
6) Pull out loading gear S block assembly ④.

[Note on Mounting]

- Adjust the phase Ⓐ between loading gear (S) and loading gear (S). (Fig. A)
- Keep clean the surface contacts tape of shuttle S block assembly ③.

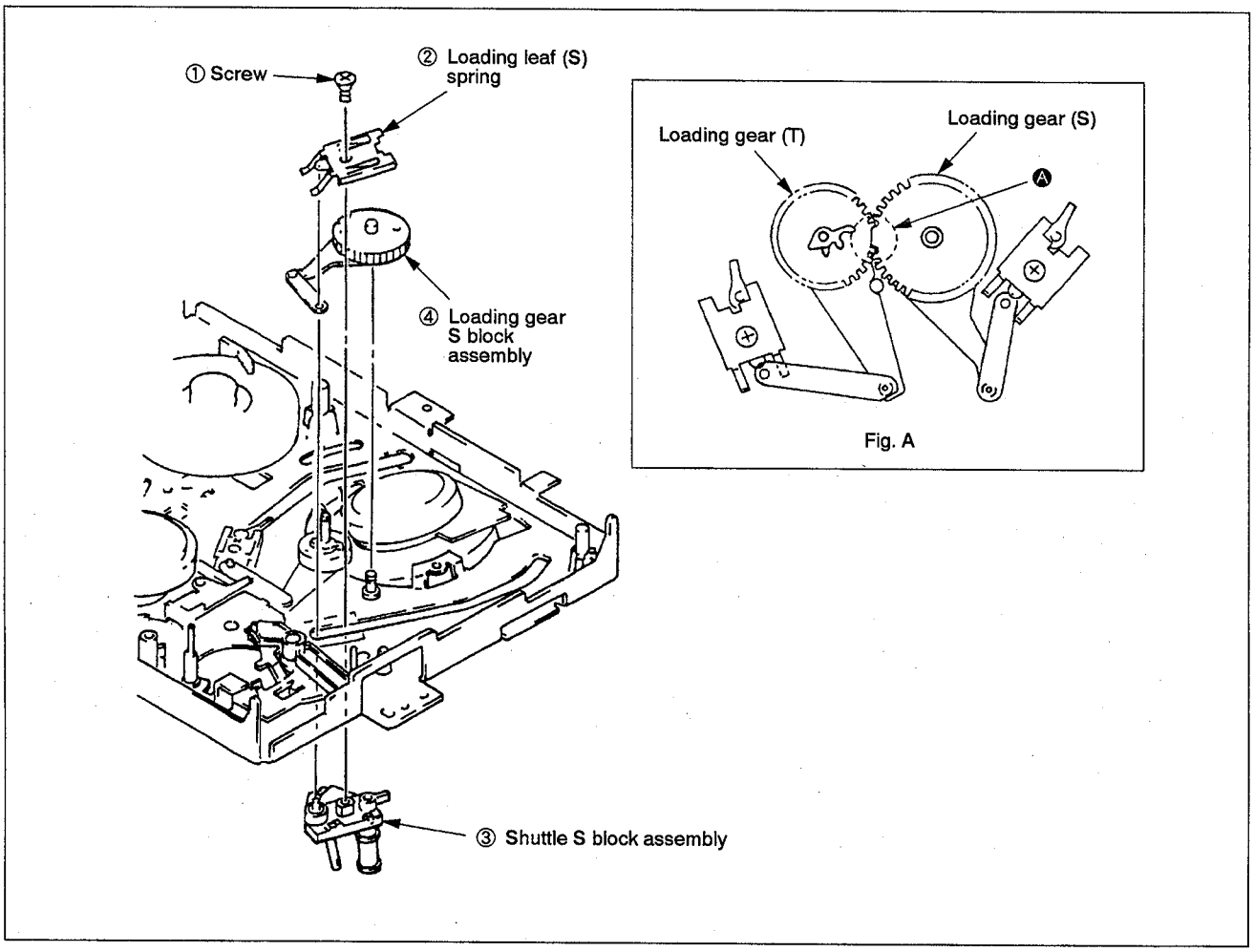


Fig. 3-22

3-21. REEL TABLE (S) ASSEMBLY (Fig. 3-23)

1) Remove tension spring ① from the chassis side.
2) Remove stopper washer (2) ② to pull out soft brake (S) ③.
3) Move TG1 band ④ over the reel table.
4) Remove stopper washer (2) ⑤.
5) While pressing main brake S assembly ⑥, pull out reel table (S) assembly ⑦.

[Note on Mounting]

- Apply one drop of Diamond Oil NT-68 (Jig Ref. No. J-13) to ☆ marked portion before mounting reel table (S) assembly ⑥. (Fig. A)
- Don't touch the hatched portion on reel table (S) assembly ⑥ with bare hand.

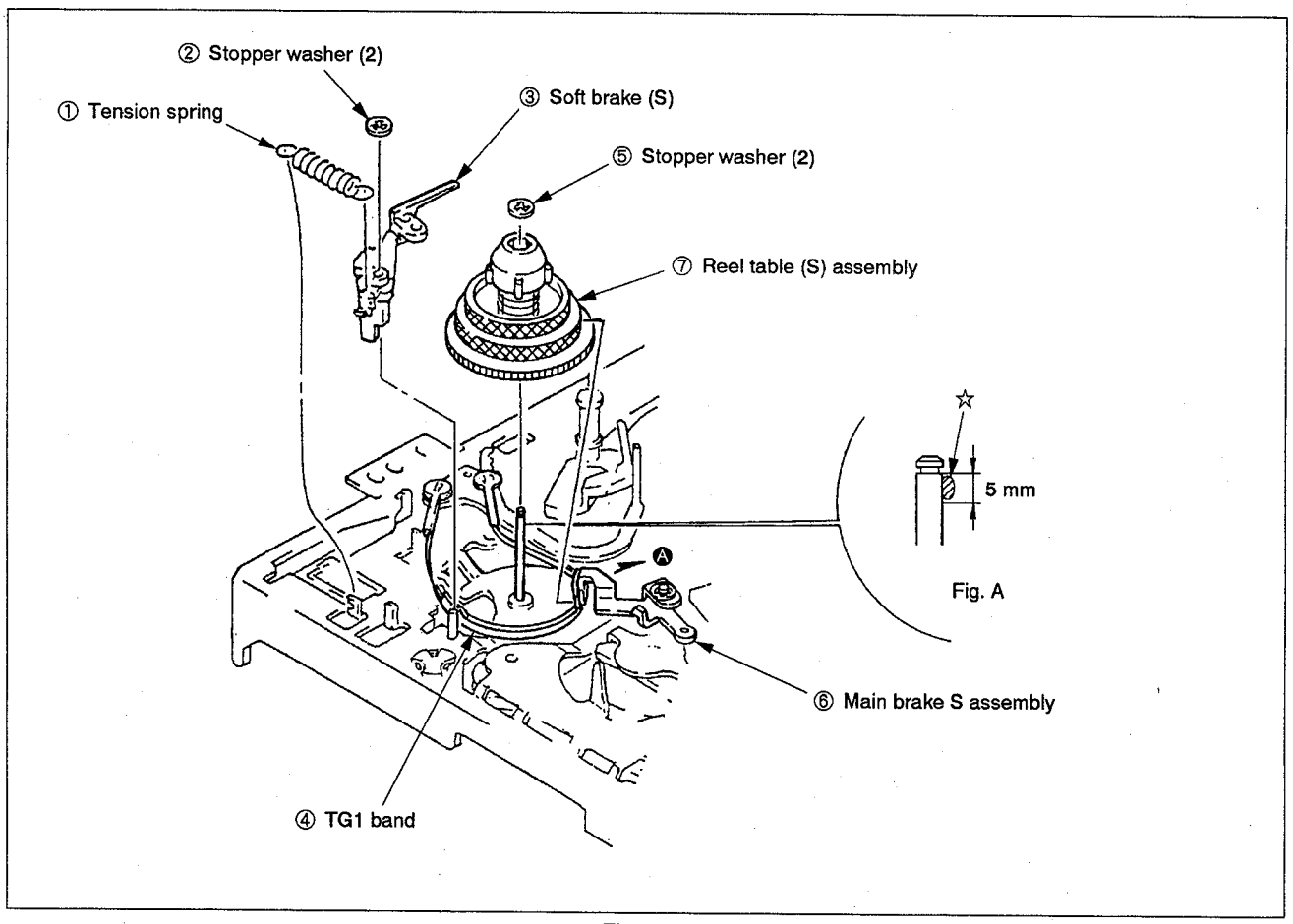


Fig. 3-23

3-22. TG1 ASSEMBLY (Fig. 3-24)

1) Set the mechanism to the loading-end condition referring to 1-1. (Cam gear indicates "LE". (Refer to Fig. A and B of Fig. 3-18.))
2) Remove tension spring ① in the order Ⓐ to Ⓑ.
3) Remove stopper washer (2) ② to pull out TG1 assembly ③.

[Note on Mounting]

- Apply one drop of Diamond Oil NT-68 (Jig Ref. No. J-13) to ☆ marked portion.
- Keep clean the felt side of TG1 assembly.

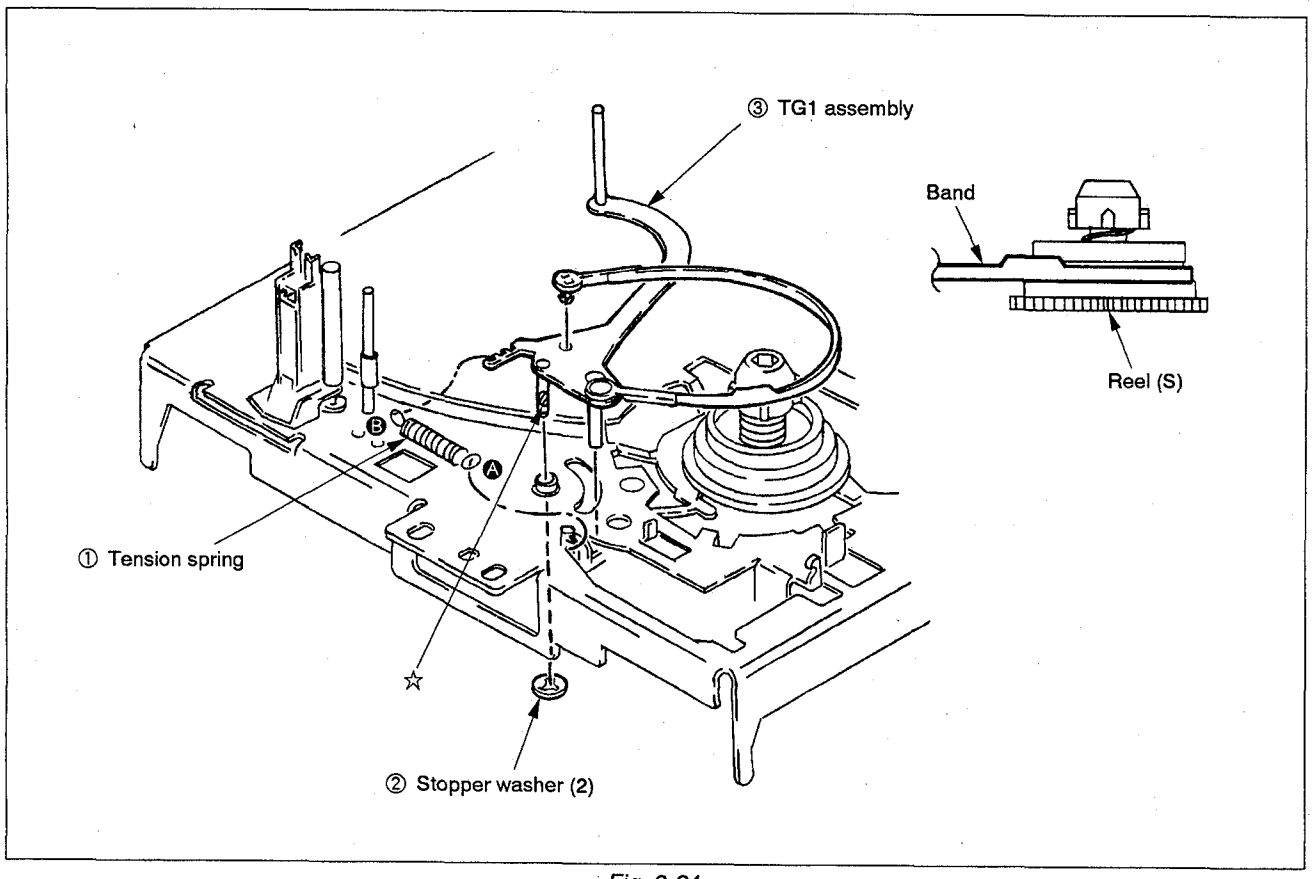


Fig. 3-24

3-23. S WINDING BLOCK ASSEMBLY (Fig. 3-25)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly. (Refer to 3-16.)
4) Remove main slider. (Refer to 3-18.)
5) Remove stopper washer (2) ① to pull out S winding block assembly ②.
6) Remove torsion spring ③.

[Note on Mounting]

- At the last, hang torsion spring ② to the position Ⓐ.
- Apply FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portions.

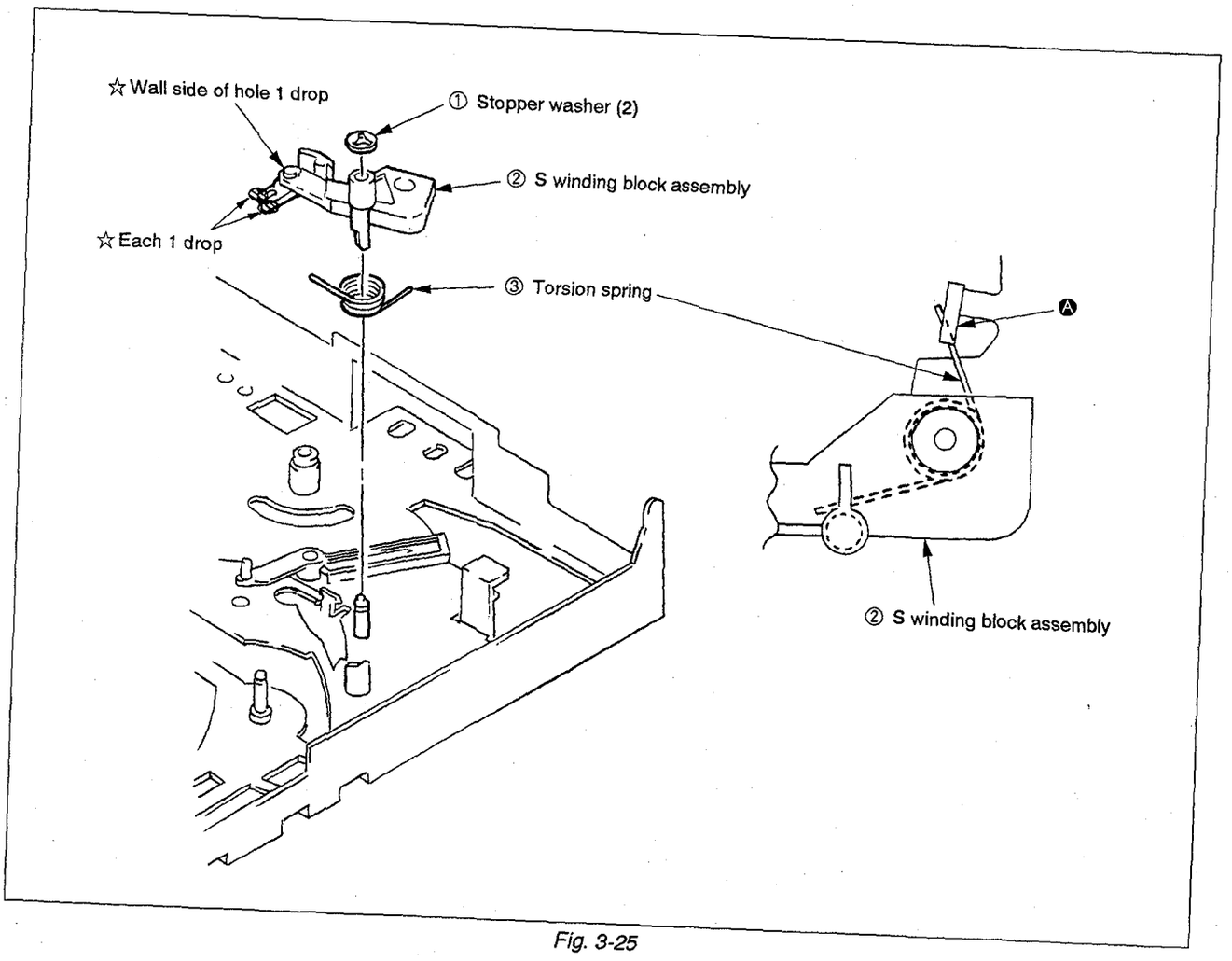


Fig. 3-25

3-24. TRIGGER LEVER AND RKB BLOCK ASSEMBLIES (Fig. 3-26)

1) Remove timing belt. (Refer to 3-3.)
2) Remove CAP brake assembly. (Refer to 3-4.)
3) Remove cam motor chassis block assembly. (Refer to 3-16.)
4) Remove main slider. (Refer to 3-18.)
5) Remove tension spring ① in the order Ⓐ to Ⓑ to remove trigger lever assembly ②.
6) Remove screws (3 × 8) ③ to remove RKB block assembly ④.

[Note on Mounting]

- Apply FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portions on trigger lever assembly. (Fig. A)

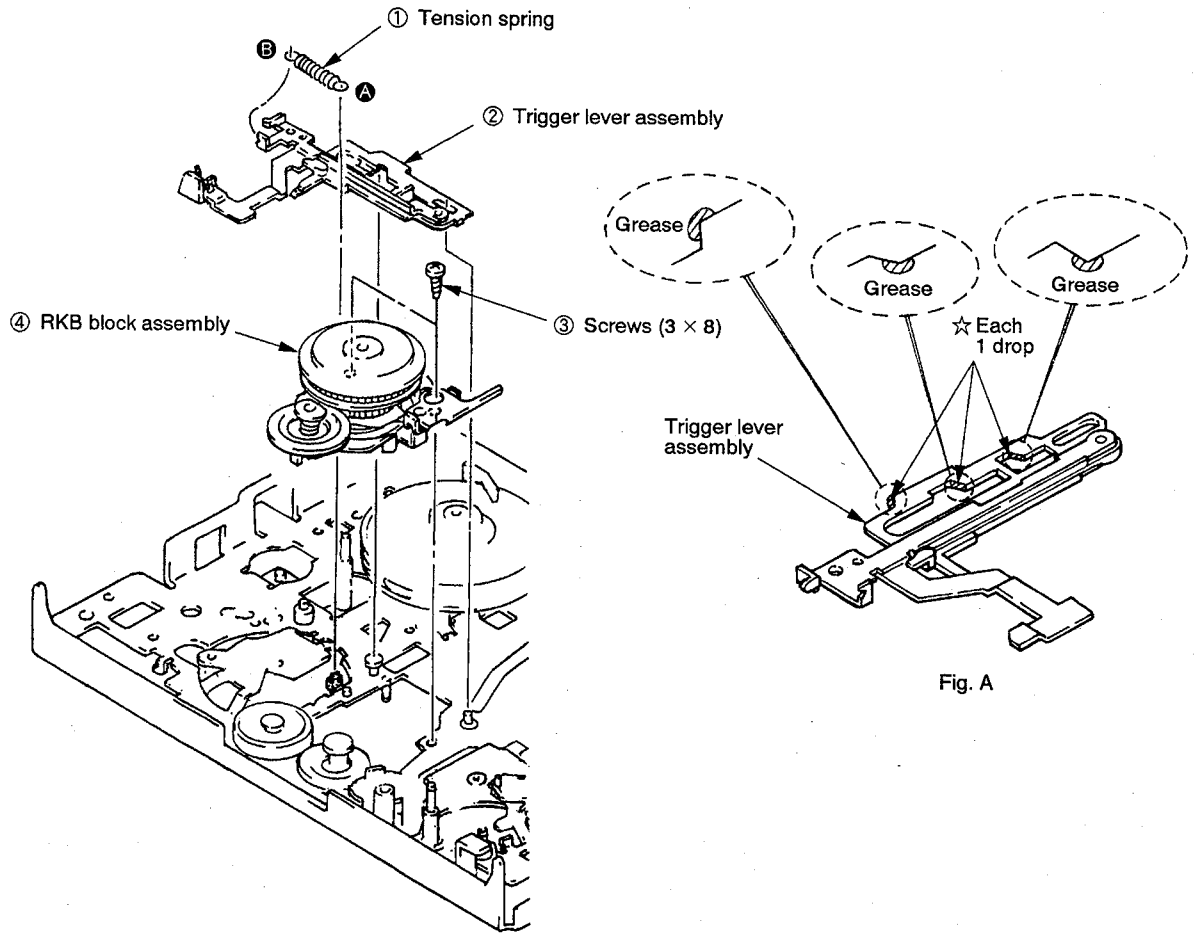


Fig. A

Fig. 3-26

4. ADJUSTMENT

4-1. TAPE PATH ADJUSTMENT

The "Tape path" refers to the route of the tape from the supply reel disk to the take-up reel disc via the video heads.
Each component part of the tape transport system particularly the surface of parts which make direct contact with the tape must always be kept clean, free of dust, oil, scratches and so forth.
The tape path system is factory preadjusted, when parts of the tape transport system are replaced, be sure to make the required adjustments as precisely as possible in order to ensure stable tape transport.

4-1-1. TENSION REGULATOR (TG1) POSITION/ TENSION ADJUSTMENT (Fig. 4-1)

Purpose: stabilizes contact of the video head and the tape to maintain the tension of the tape so that it feeds at a constant level.

- **Position adjustment**

Mode	Treading is completed without a cassette loaded
Adjustment locations	Eccentric pin of TG1 band assembly

[Adjustment Method]

1) Allow the unit to go through the threading procedure without a cassette loaded.
2) Set the unit to play back, then turn the eccentric pin so that the tip of tension arm goes to the left side line carved on the mechanical chassis. (Fig. A)
3) After adjustment, go through the loading procedure once more without a cassette loaded, then check the position of the tension arm.

- **Tension adjustment**

Mode	Playback
Measuring instrument/tool	Torque cassete
Adjustment locations	Position for hooking the tension spring
Specified value	36 to 44 g•cm

[Adjustment Method]

1) Playback the torque cassette.
2) Check that the center value deviation reading on the torque cassette meets with the standards.
3) When the reading is higher than the standards: Move the spring toward direction Ⓐ.
   When the reading is less than the standards: Move the spring toward direction Ⓑ.

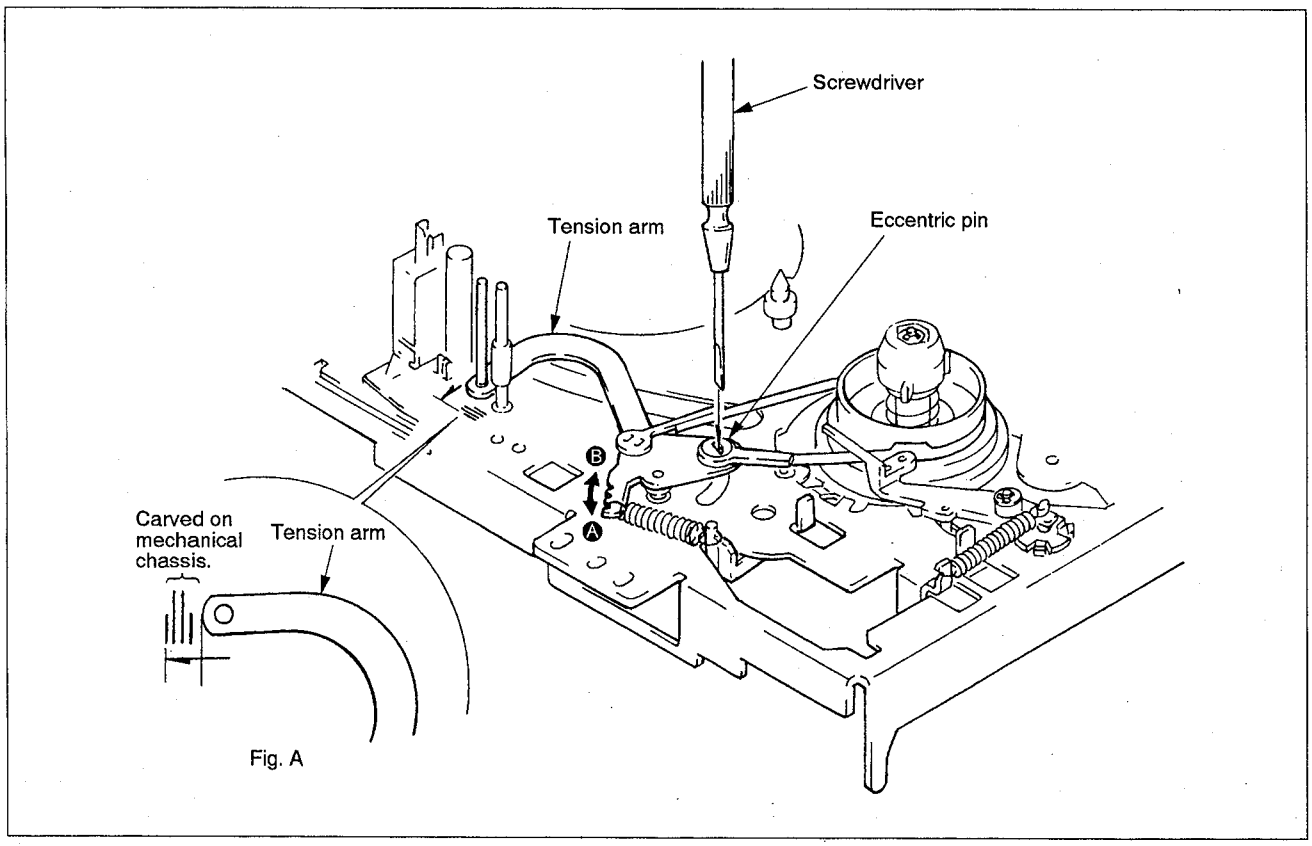


Fig. 4-1

4-1-2. TG8 GUIDE ROLLER HEIGHT ADJUSTMENT (Fig. 4-2)

Mode	Playback
Jig	Blank tape
Adjustment locations	Guide roller height adjustment screw
Specified value	0 to 0.1 mm

Procedure:

1) Set the tape, during CUE playing back, check the height from lower flange of TG7 to the running tape. (Fig. A)
2) During REV playing back, check the height from lower flange of TG7 to the running tape. (Fig. B)
3) When the difference between items 1) and 2) doesn't go to specified value, adjust by turning TG8 guide roller height adjustment screw.
4) Check the tape is creased or not between the capstan and TG8, adjust with TG8 guide roller height adjustment screw so that the tape is not creased during normal playback, CUE and REV.

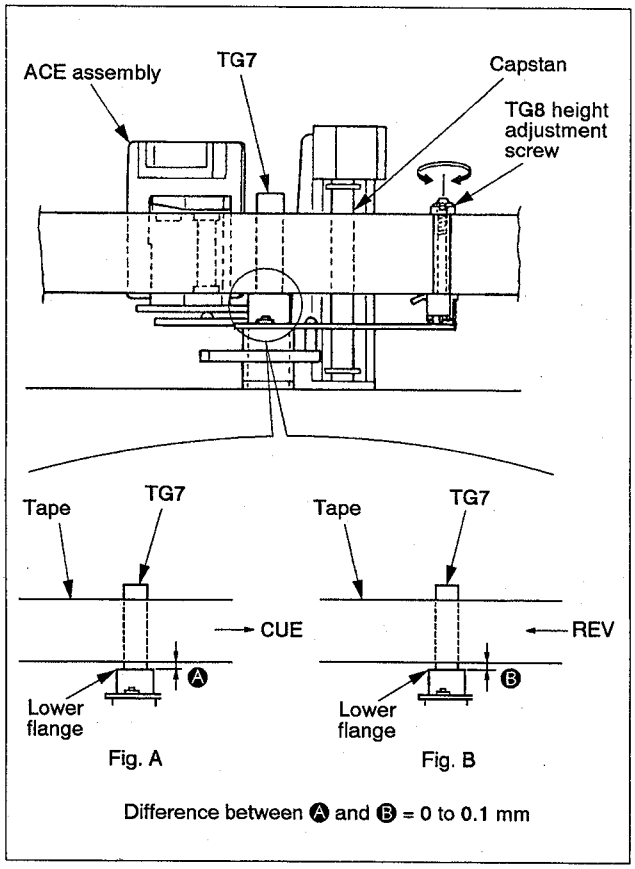


Fig. 4-2

4-1-3. HEIGHT ADJUSTMENT OF GUIDE ROLLERS NO. 3 AND NO. 6 (Fig. 4-3)

Mode	Playback
Signal	Alignment tape
Measuring instrument	Oscilloscope
Measuring point	CH-1: Connector PB RF pin for RF PC board check. CH-2: Connector RF SW P pin for RF PC board check.
Adjustment locations	Guide roller height adjuster screw

[Adjustment Method]

1) Tracking (playback): Turn off the auto tracking, then press the tracking buttons ▽ and △ simultaneously to set the tracking at the center position.
   (If adjustment is made after the drum is replaced, the tracking must be set at the max. RF output position.)
2) Height adjuster screw: Even out the RF output waveforms.
3) Press the tracking buttons (playback), ▽ and △ alternately.
4) Check that RF output drops the same amount at the front and rear edges.

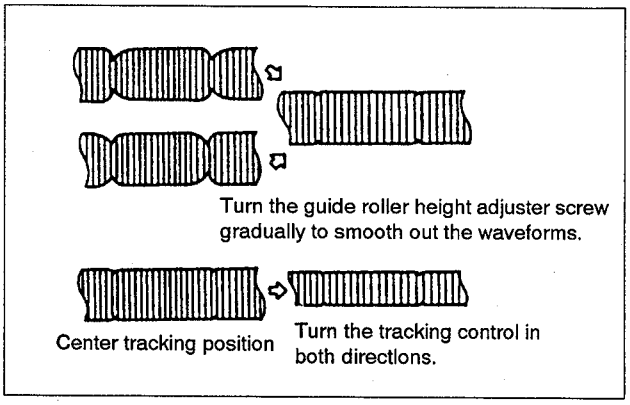

Turn the guide roller height adjuster screw gradually to smooth out the waveforms.
Center tracking position
Turn the tracking control in both directions.

Fig. 4-3

4-1-4. ACE HEAD ASSEMBLY ADJUSTMENT (ROUGH ADJUSTMENT) (Figs. 4-4 and 4-5)

Purpose: Allows the tape to make even contact with the head for recording and playback of the specified track.

Mode	Playback
Tool	Blank tape
Adjustment locations	Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Mount the ACE head assembly. At this time, adjust the height so that the height of guide flange No. 7 matches the level of the lower edge of the control head.
2) Remove the adjustment tool and load a new tape, then set the unit for playback.
3) Check that the tape does not curl or rise up noticeably near the ACE head.
4) If the tape curls up or rises noticeably, readjust the tilt adjuster screw, the azimuth adjuster screw and the height adjuster nut.
   (The height of the ACE head should be adjusted so that the lower edge of the tape is approx. 0.1 to 0.15 mm from the control head.)
5) Perform precision adjustment.

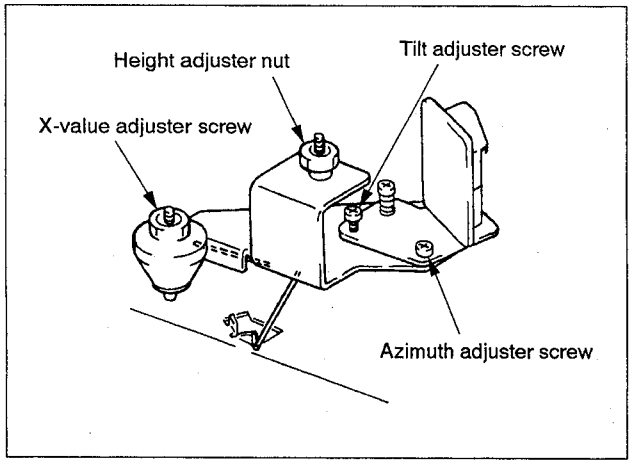


Fig. 4-4

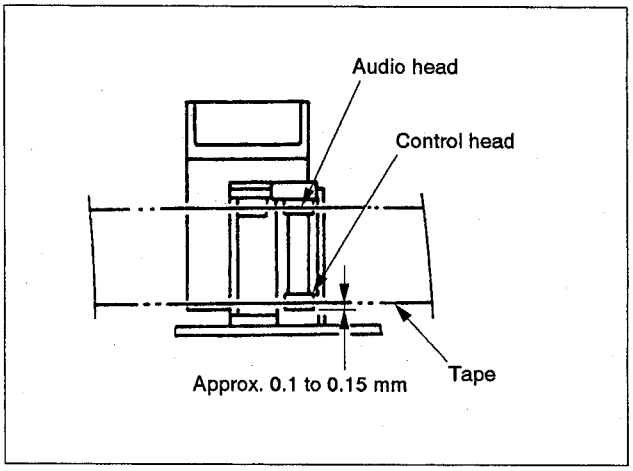


Fig. 4-5

4-1-5. ACE HEAD ASSEMBLY ADJUSTMENT (PRECISION ADJUSTMENT)

Mode	Playback
Signal	Alignment tape (1kHz track)
Measuring instrument	Oscilloscope
Measuring point	Audio output terminal
Adjustment locations	Azimuth adjuster screw, Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Adjust the tilt adjuster screw in the FWD or REV mode so that the lower flange of guide No. 7 does not curl up or rise.
2) Alternately adjust the azimuth adjuster screw, the height adjuster nut, and the tilt adjuster screw to maintain even audio output at maximum with minimum deviation.

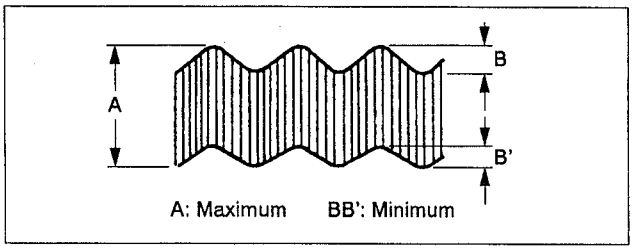


Fig. 4-6

4-1-6. X-VALUE ADJUSTMENT

Purpose: To obtain compatibility with other VTR

Precaution: Be sure to perform the preset tracking adjustment before perform this adjustment. (Refer to the Service Guide.)
Turn off the auto tracking and set the VTR for manual tracking mode.

Mode	Playback
Signal	Alignment tape
Measuring instrument	Oscilloscope
Measuring point	CH-1: Connector PB RF pin for RF PC board check. CH-2: Connector RF SW P pin for RF PC board check.
Adjustment locations	X-value adjuster screw

[Adjustment Method]

- **Adjustment by Hi-Fi alignment tape (NTSC only)**
  When the tracking is set at the center position (by pressing the ▽ and △ keys simultaneously), adjust the RF output to maximum.

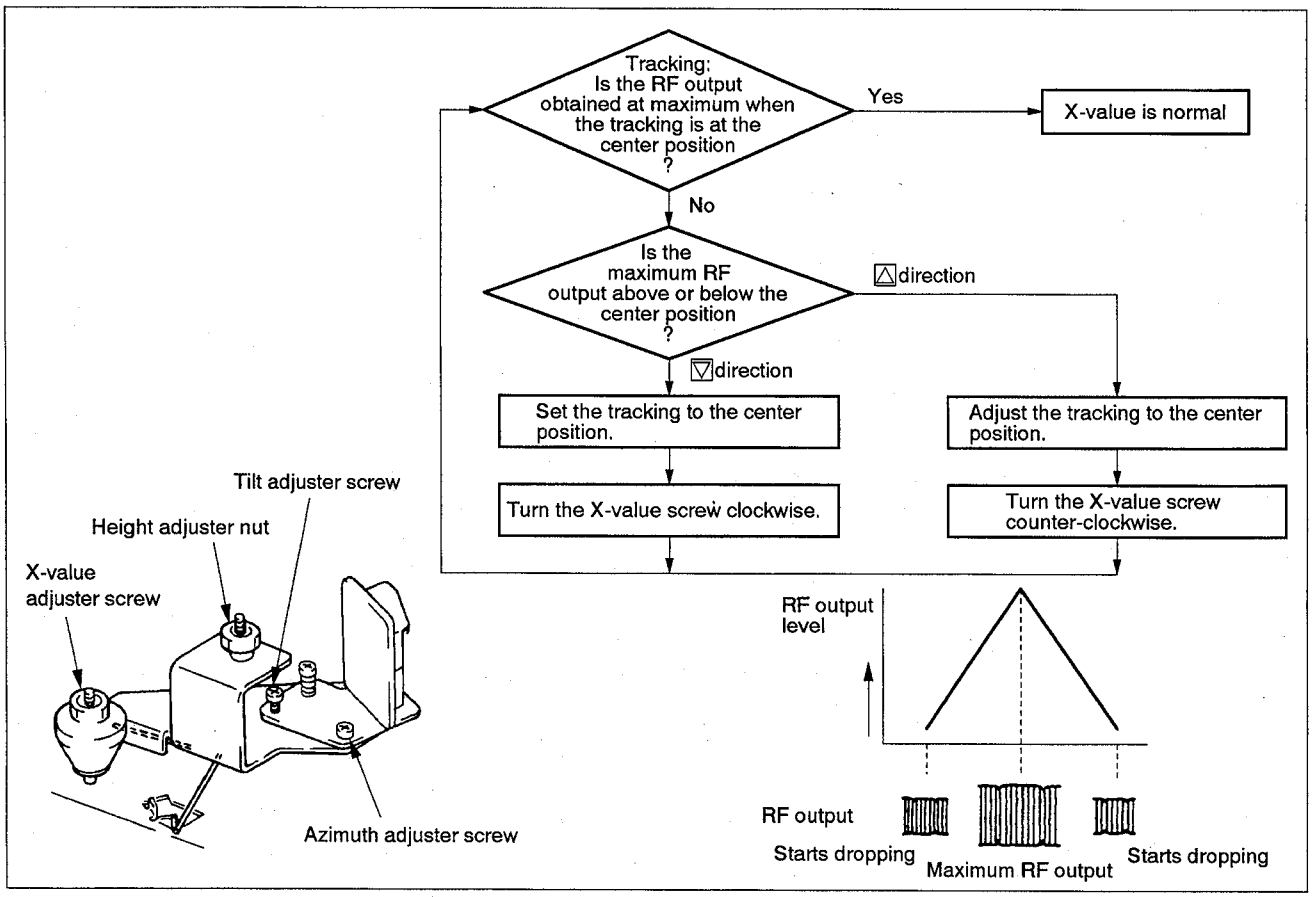

Tracking:
Is the RF output obtained at maximum when the tracking is at the center position ?
Yes
X-value is normal
No
Is the maximum RF output above or below the center position ?
△direction
▽direction
Set the tracking to the center position.
Adjust the tracking to the center position.
Turn the X-value screw clockwise.
Turn the X-value screw counter-clockwise.
Tilt adjuster screw
Height adjuster nut
X-value adjuster screw
Azimuth adjuster screw
RF output level
RF output
Starts dropping
Maximum RF output
Starts dropping

Fig. 4-7

- **Adjustment by alignment tape**

  Adjust the X-value adjuster screw so that maximum RF output is obtained and also that the RF output drops to the same position on pressing the respective ▽ and △ buttons while the tracking is set at the center position.

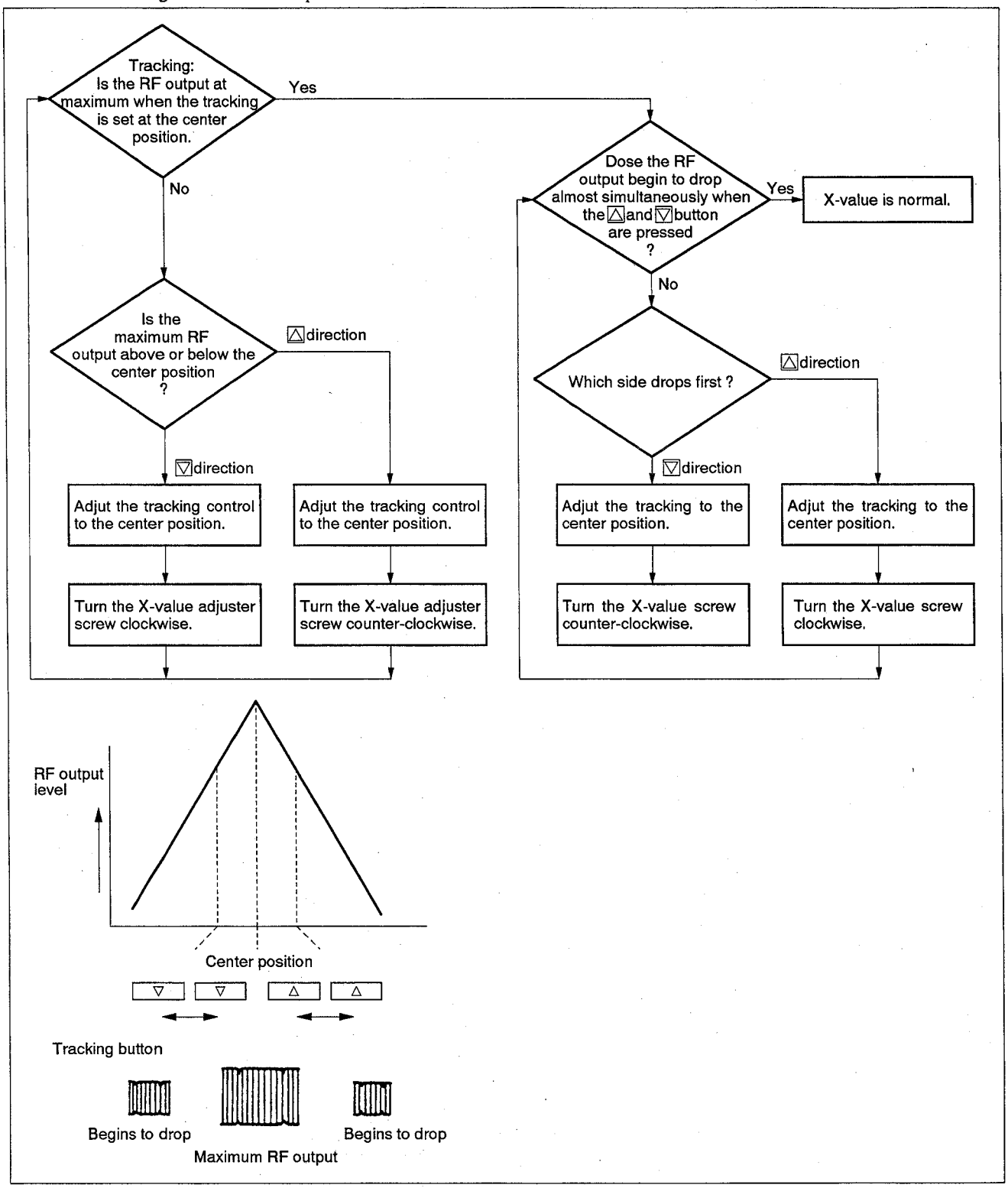

Tracking: Is the RF output at maximum when the tracking is set at the center position.
Yes
No
Dose the RF output begin to drop almost simultaneously when the △ and ▽ button are pressed ?
Yes
X-value is normal.
No
Is the maximum RF output above or below the center position ?
△direction
▽direction
Which side drops first ?
△direction
▽direction
Adjut the tracking control to the center position.
Adjut the tracking control to the center position.
Adjut the tracking to the center position.
Adjut the tracking to the center position.
Turn the X-value adjuster screw clockwise.
Turn the X-value adjuster screw counter-clockwise.
Turn the X-value screw counter-clockwise.
Turn the X-value screw clockwise.
RF output level
Center position
▽ ▽ △ △
Tracking button
Begins to drop
Maximum RF output
Begins to drop

Fig. 4-8

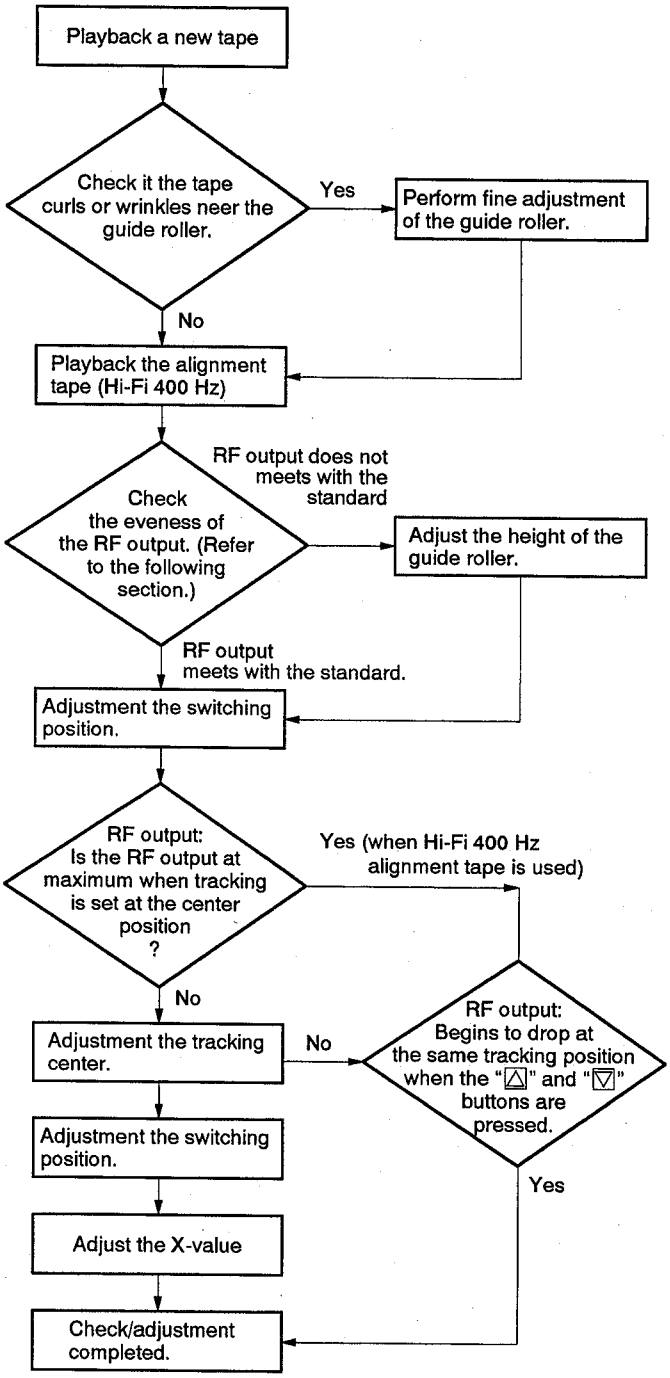
4-1-7. ADJUSTMENTS AFTER REPLACING THE DRUM (VIDEO HEAD)

Purpose: Co-relative height, X-value and other factors of the drum will deviate from those of the guide roller. If the drum is replaced properly, these deviations are extremely small.

Precaution: Turn off the auto tracking and set the manual tracking mode.

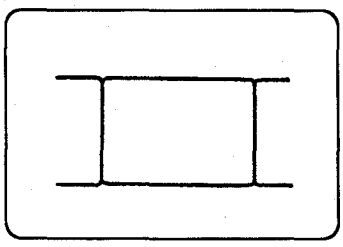
Mode	Playback
Signal	Alignment tape, blank tape
Measuring instrument	Oscilloscope
Measuring point	CH-1: Connector PB RF pin for RF PC board check. CH-2: Connector RF SW P pin for RF PC board check.
Adjustment locations	Guide roller (refer to 4-1-2, 4-1-3.) Switching position, Tracking preset, SP delay mono-multi (Refer to the Service Manual), X-value. (refer to 4-1-6.)

[Adjustment Method]

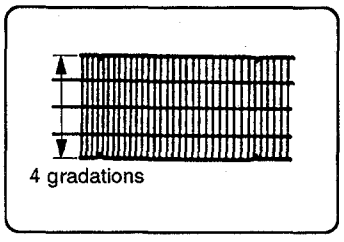

Playback a new tape
Check it the tape curls or wrinkles neer the guide roller.
Yes
Perform fine adjustment of the guide roller.
No
Playback the alignment tape (Hi-Fi 400 Hz)
RF output does not meets with the standard
Check the eveness of the RF output. (Refer to the following section.)
Adjust the height of the guide roller.
RF output meets with the standard.
Adjustment the switching position.
RF output: Is the RF output at maximum when tracking is set at the center position ?
Yes (when Hi-Fi 400 Hz alignment tape is used)
No
Adjustment the tracking center.
No
RF output: Begins to drop at the same tracking position when the "△" and "▽" buttons are pressed.
Yes
Adjustment the switching position.
Adjust the X-value
Check/adjustment completed.

[Checking the evenness and fluctuation of the RF output]

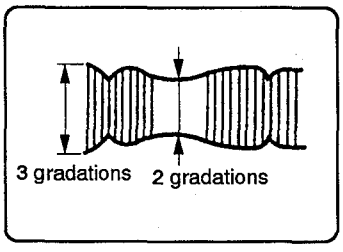
1) Set the RF output to the maximum level using the tracking buttons.



2) Perform fine adjustment of the voltage level range of the oscilloscope, then adjust the RF output deviation to within 4 gradations.



3) Press the tracking buttons and adjust the maximum amplitude of the RF output to within 3 gradations.
4) At this time, check if the minimum amplitude is more than 2 gradations.



5) Check that the RF output fluctuation between minimum and maximum levels is within 13%.

4-1-8. CHECKING THE TENSION AND TORQUE

Purpose: To check that the tension, torque and compression force of the tape take-up section and mobile sections to ensure smooth tape run and achieve standard VTR performance.

If the tape transport is not smooth or problems occur in relation to the tape transport speed, perform the following check.

Mode	Each operation mode without loading a cassette tape. (Refer to section 1-3.)
Measuring instrument	Torque gauge, Torque gauge adaptor

Item	VTR operation mode	Reel to be measured	Measurement value
Main brake torque	Stop	Supply and take-up reels	170 g•cm or more
Review torque	Review	Supply reel	180 ± 30 g•cm (using the torque cassette)
Take-up torque	Playback	Take-up reel	95 ± 25 g•cm (using the torque cassette)
Back tension torque	Playback	Take-up reel	33 to 44 g•cm (using the torque cassette)

[Check Method]

Measure the torque using the torque gauge and torque gauge adaptor with the torque gauge fixed.

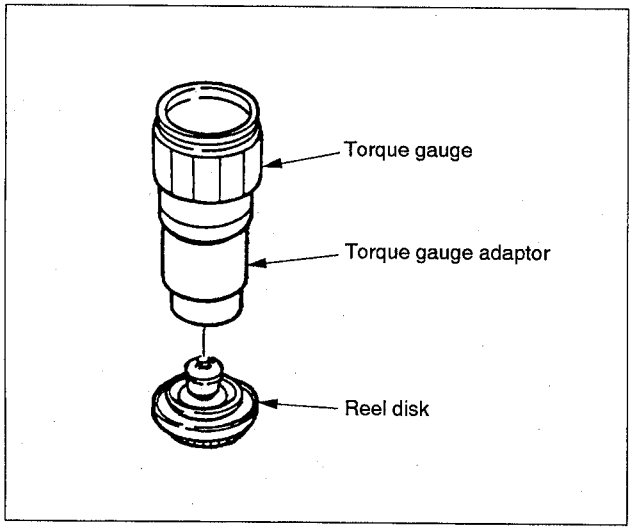


Fig. 4-9

VHS MECHANICAL ADJUSTMENT MANUAL IV

Sony Corporation
Consumer A&V Products Company
Home A&V Products Div.

9-973-623-11

Published by Personal A&V Products Div.
Quality Engineering Dept.

VHS MECHANICAL ADJUSTMENT MANUAL IV

SONY®
SERVICE MANUAL

H MECHANISM

SUPPLEMENT-1

1. How to Use the Mode Selector II for Adjusting H Type Mechanism Assembly.
2. Adjusting Mechanism Using New Alignment Tape (KRV-52NE For NTSC).

File this supplement with the VHS mechanical adjustment IV.

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MICROFILM

1. HOW TO USE THE MODE SELECTOR II FOR ADJUSTING H TYPE MECHANISM ASSEMBLY

1-1. OUTLINE

To activate the VHS system H type mechanism assembly using mode selector II (J-6082-282-A), use connector conversion jig (J-6090-052-A). By using the connector conversion jig, the following operations are possible.

- Loading and unloading action by the loading motor
- Reading of the current setting of the mode switch
- Normal and reverse rotation of the capstan motor

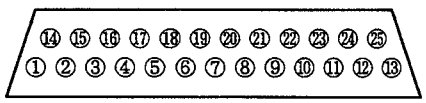
1-2. PREPARATION

1-2-1. ADDITION OF POWER SUPPLY CABLE (Already added Mode Selector II also available)

In order to drive the capstan motor, the power +5 V and +12 V are supplied from the Mode Selector II. Disassemble the D-SUB connector of the Mode Selector cable, then solder the following three places.

Supplied 3-pin cable	DSUB connector of the mode selector II	Voltage
Pin 1 (Red index)	Pin 20	+12 V
Pin 2	Pin 25	GND
Pin 3	Pin 24	+5 V

- Connector pin number assignment of the DSUB connector (From the soldering side)



- When connections are made, check that +5 V and +12 V are available at the 3-pin cable connector.

1-2-2. CHECKING THE SOFTWARE VERSION

Turn on the power of the mode selector II.
If the reading for the software version on the mode selector II is not 1.10 or higher, replace the New ROM (J-6082-314-A).

1-3. CONNECTION

1-3-1. CONNECTION BETWEEN THE CONNECTOR CONVERSION JIG AND THE MODE SELECTOR II (See Fig. 1-1)

Insert the connectors of the two 6-pin cables (one is white and the other is black) and the 3-pin cable from the mode selector II to the corresponding connectors on the connector conversion jig (J-6090-052-A).

1-3-2. CONNECTION BETWEEN THE CONNECTOR CONVERSION JIG AND THE H TYPE MECHANISM ASSEMBLY

With the power of the mode selector II turned off, insert the following three connectors to the corresponding connectors on the H type mechanism assembly.

- 3-pin connector for the loading motor
- 5-pin connector for the mode switch
- 8-pin connector for the capstan motor

Set the speed control for the minimum setting (fully counter-clockwise).

1-4. OPERATION

1-4-1. OPERATION OF THE LOADING MOTOR ON THE H TYPE MECHANISM ASSEMBLY

(1) Select the H type mechanism assembly setting on the mode selector II .
(2) After this, procedures are the same as those for the previous model types.
For the operating method, see pages 3 to 5 of "8 mm Video Mechanism Manual VI (TK Mechanism) Supplement-1".
For the loading method, see page 3 of "VHS Mechanical Adjustment Manual IV (H Mechanism)".

1-4-2. OPERATION OF THE CAPSTAN MOTOR ON THE H TYPE MECHANISM ASSEMBLY

(1) For the loading motor operation under Section 1-4-1, change the mode setting to the FF/REW mode with the mode switch.
(2) Turn the speed control gradually in clockwise direction, and the capstan motor starts rotating. To turn the capstan motor in desired rotating direction, change the FWD/RVS setting of the rotating direction switch.

1-5. PRECAUTIONS

- Turn the speed control only when necessary. Otherwise, hold the speed control turned at fully counterclockwise direction. If the power of the mode selector II is turned on with the speed control turned in clockwise direction, +12V power fails and the power of the mode selector II cannot be turned on.
- Although the connector conversion jig (J-6090-052-A) has rubber feet, do not make a short circuit on the bottom surface of the connector conversion jig via foreign conductive materials.

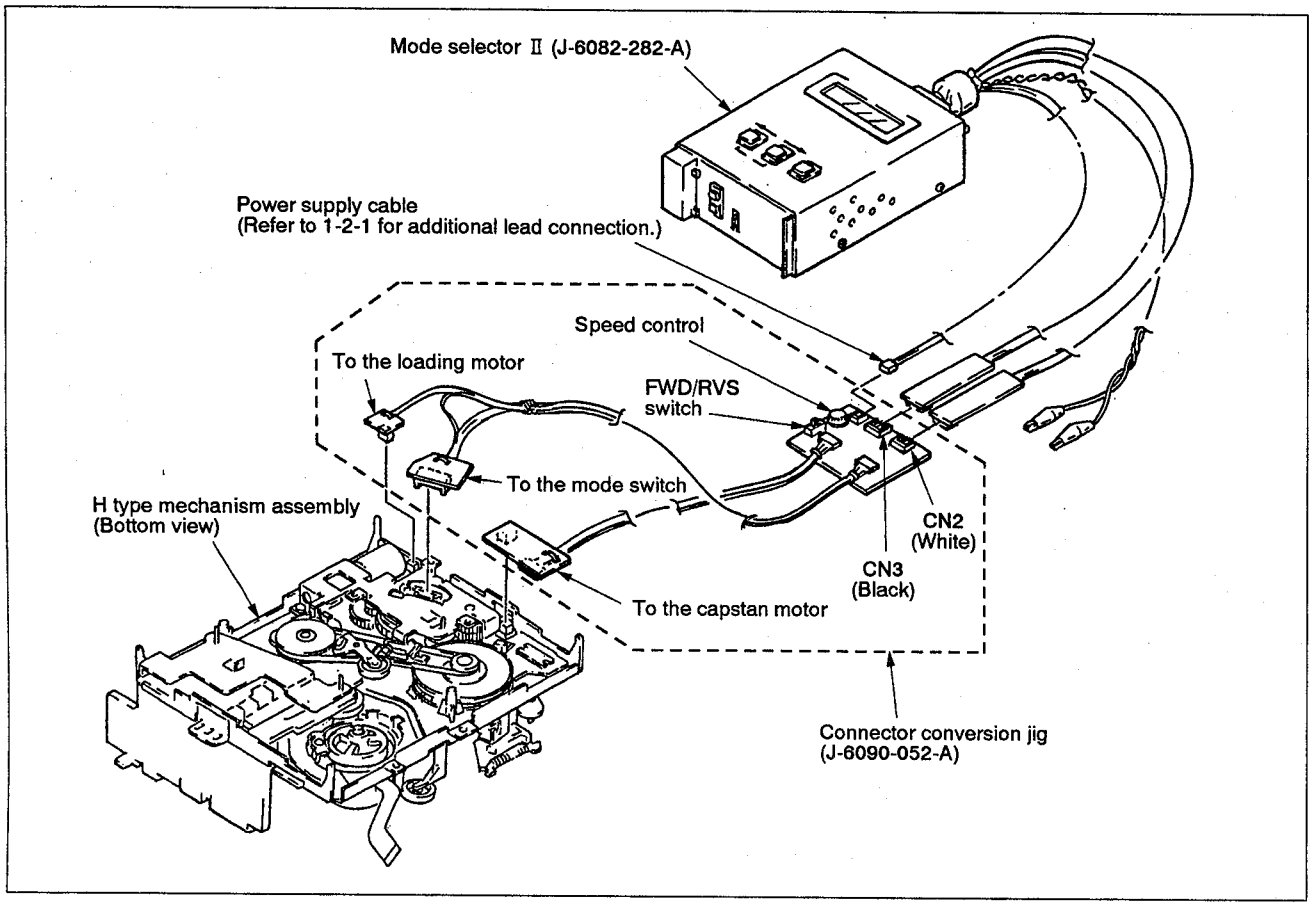

Mode selector II (J-6082-282-A)
Power supply cable
(Refer to 1-2-1 for additional lead connection.)
Speed control
To the loading motor
FWD/RVS
switch
To the mode switch
H type mechanism assembly
(Bottom view)
CN2
(White)
CN3
(Black)
To the capstan motor
Connector conversion jig
(J-6090-052-A)

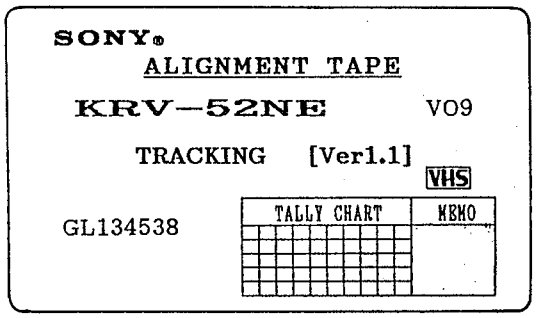
Fig. 1-1

2. ADJUSTING THE MECHANISM USING NEW ALIGNMENT TAPE (KRV-52NE for NTSC)

The conventional alignment tape (For NTSC) is now replaced with alignment tape KRV-52NE, and the following describes how to align the mechanism using the KRV-52NE. For details on the use of KRV-51N2 for each model, refer to the service manuals which will be issued in the future.

Name	Parts No.	Remarks
Alignment tape KRV-52NE for NTSC	8-192-605-41	For tape path, audio azimuth, and X-value adjustments
Alignment tape KRV-51N2 for NTSC	8-192-605-32	For electrical adjustments (RF, AF, and switching position) and operation check

Note: The KRV-52NE has or does not have Ver No. depending on new or old type as shown below. (New one has Ver No.)
Note that an adjusting method of X-value is different.



Contents:
KRV-52NE (NTSC)

Time	Video	Audio
20 min.	Recording only at 1 MHz, A-ch. EP mode RF skipping once per 5 frames	5 kHz full tracks

KRV-51N2 (NTSC)

Class	Mode	Time	Video	Audio (HIFI/Normal)
1	SP	7 min.	Color bar	400 Hz
2	SP	3 min.	Mono. scope	400 Hz
3	EP	7 min.	Color bar	400 Hz
4	EP	3 min.	Mono. scope	400 Hz

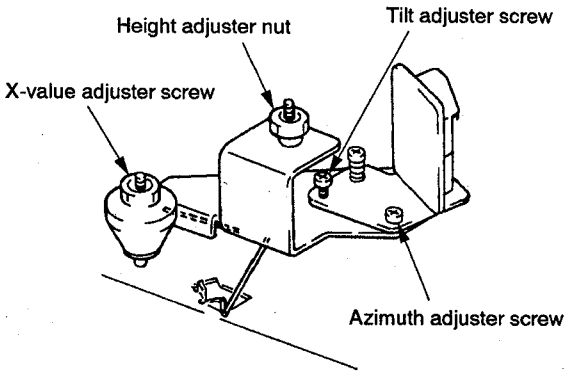
2-1. ADJUSTMENT USING ALIGNMENT TAPE (KRV-52NE for NTSC having no version No.)

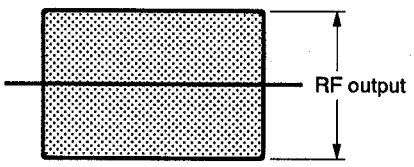
2-1-1. X-VALUE ADJUSTMENT (Using the tape having no version No.)

Purpose: To obtain compatibility with other VCRs.

Precaution: Before starting to adjust X-value, set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape KRV-52NE (For NTSC having no version No.)
Measuring instrument	Oscilloscope TIM/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH-1: Connector PB RF pin for RF PC board check CH-2: Connector RF SWP pin for RF PC board check
Adjustment locations	X-value adjuster screw

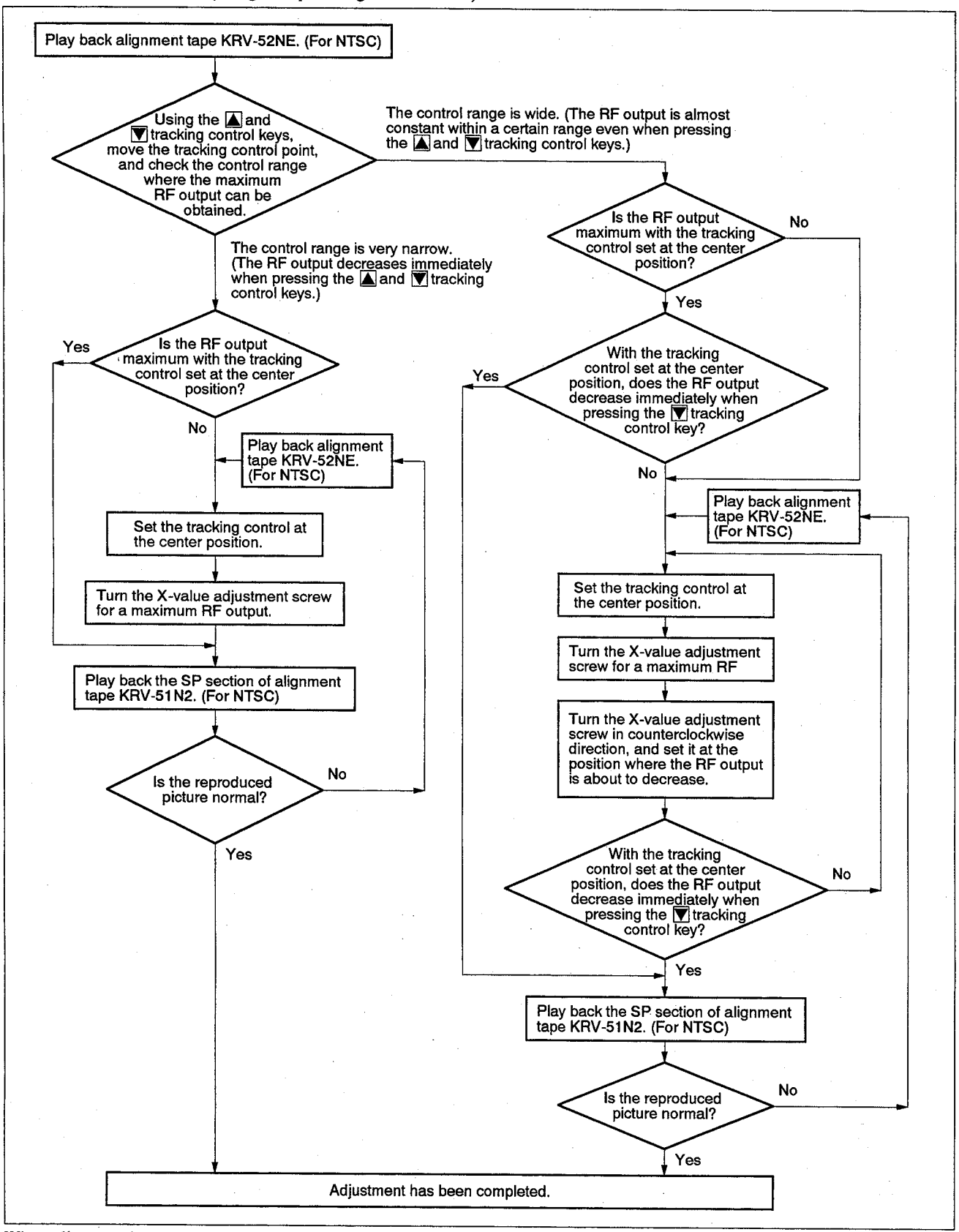




RF output shall be maximum at the center position of the tracking control.

[Adjustment Method]
Set the tracking control at the center position. For the VCRs equipped with narrow gap video heads, set the X-value adjustment screw where a maximum RF output is obtained. For the VCRs equipped with wide gap video heads, set the X-value adjustment screw both where a maximum RF output is obtained and where the RF output decreases immediately when the ▼ tracking control key is pressed.

X-VALUE ADJUSTMENT (Using the tape having no version No.)


Play back alignment tape KRV-52NE. (For NTSC)
Using the ▲ and ▼ tracking control keys, move the tracking control point, and check the control range where the maximum RF output can be obtained.
The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
No
Play back alignment tape KRV-52NE. (For NTSC)
Set the tracking control at the center position.
Turn the X-value adjustment screw for a maximum RF output.
Turn the X-value adjustment screw for a maximum RF
Turn the X-value adjustment screw in counterclockwise direction, and set it at the position where the RF output is about to decrease.
Play back the SP section of alignment tape KRV-51N2. (For NTSC)
Is the reproduced picture normal?
Yes
No
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
No
Play back the SP section of alignment tape KRV-51N2. (For NTSC)
Is the reproduced picture normal?
Yes
No
Adjustment has been completed.

When adjustment is complete, adjust the height of No. 3 and No. 6 guide rollers on page 10.

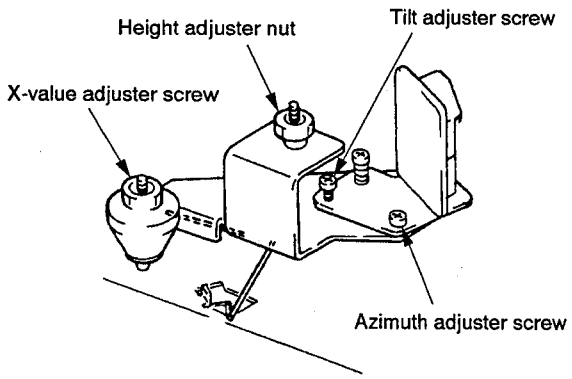
2-2. ADJUSTMENT USING ALIGNMENT TAPE (KRV-52NE for NTSC having the version No.)

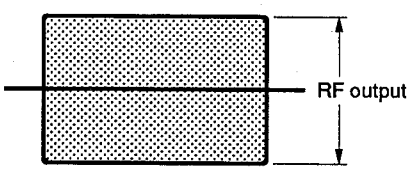
2-2-1. X-VALUE ADJUSTMENT (Using the tape having the version No.)

Purpose: To obtain compatibility with other VCRs.

Precaution: Before starting to adjust X-value, set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape KRV-52NE (For NTSC having the version No.)
Measuring instrument	Oscilloscope TIM/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH-1: Connector PB RF pin for RF PC board check CH-2: Connector RF SWP pin for RF PC board check
Adjustment locations	X-value adjuster screw



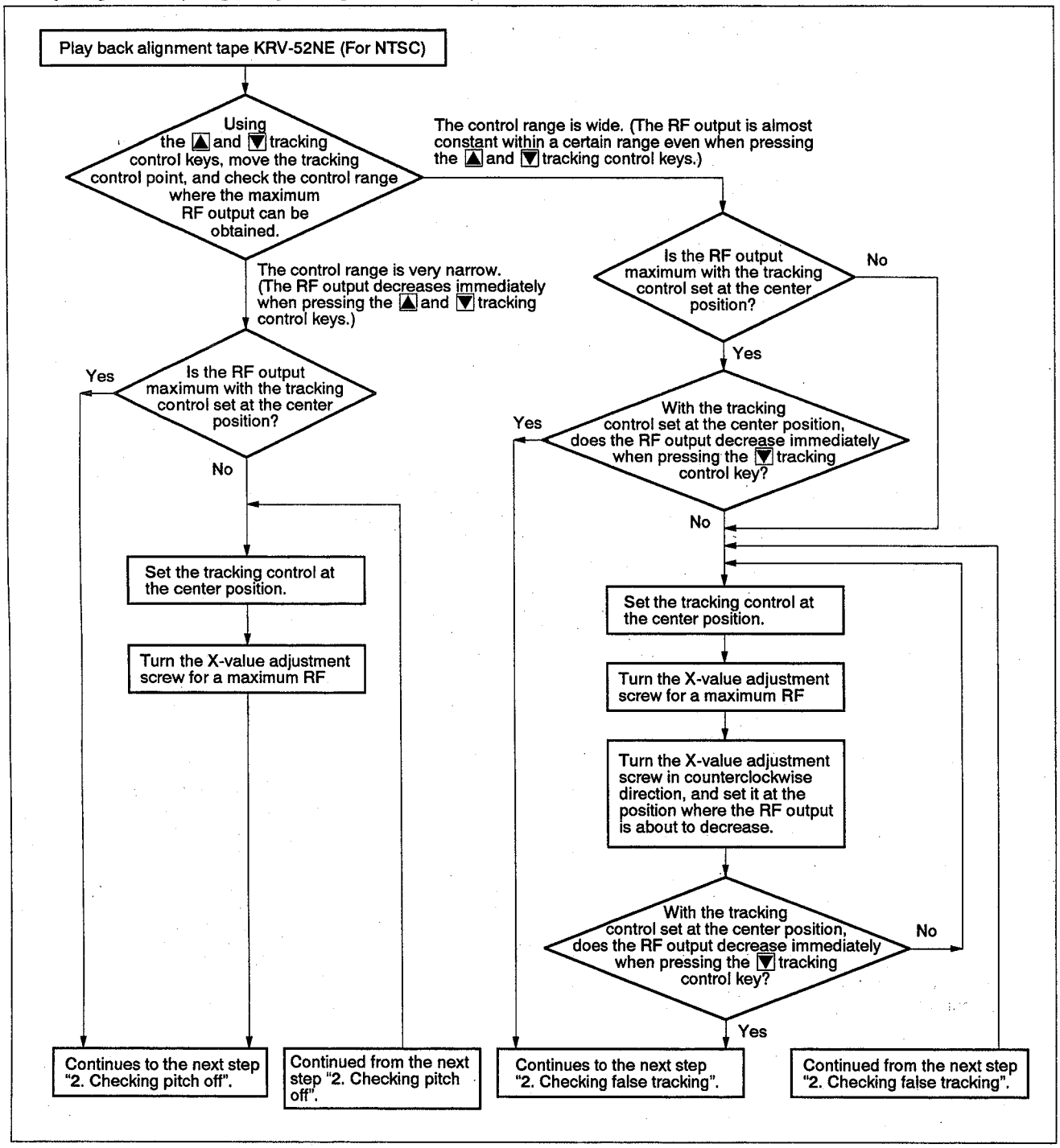


RF output shall be maximum at the center position of the tracking control.

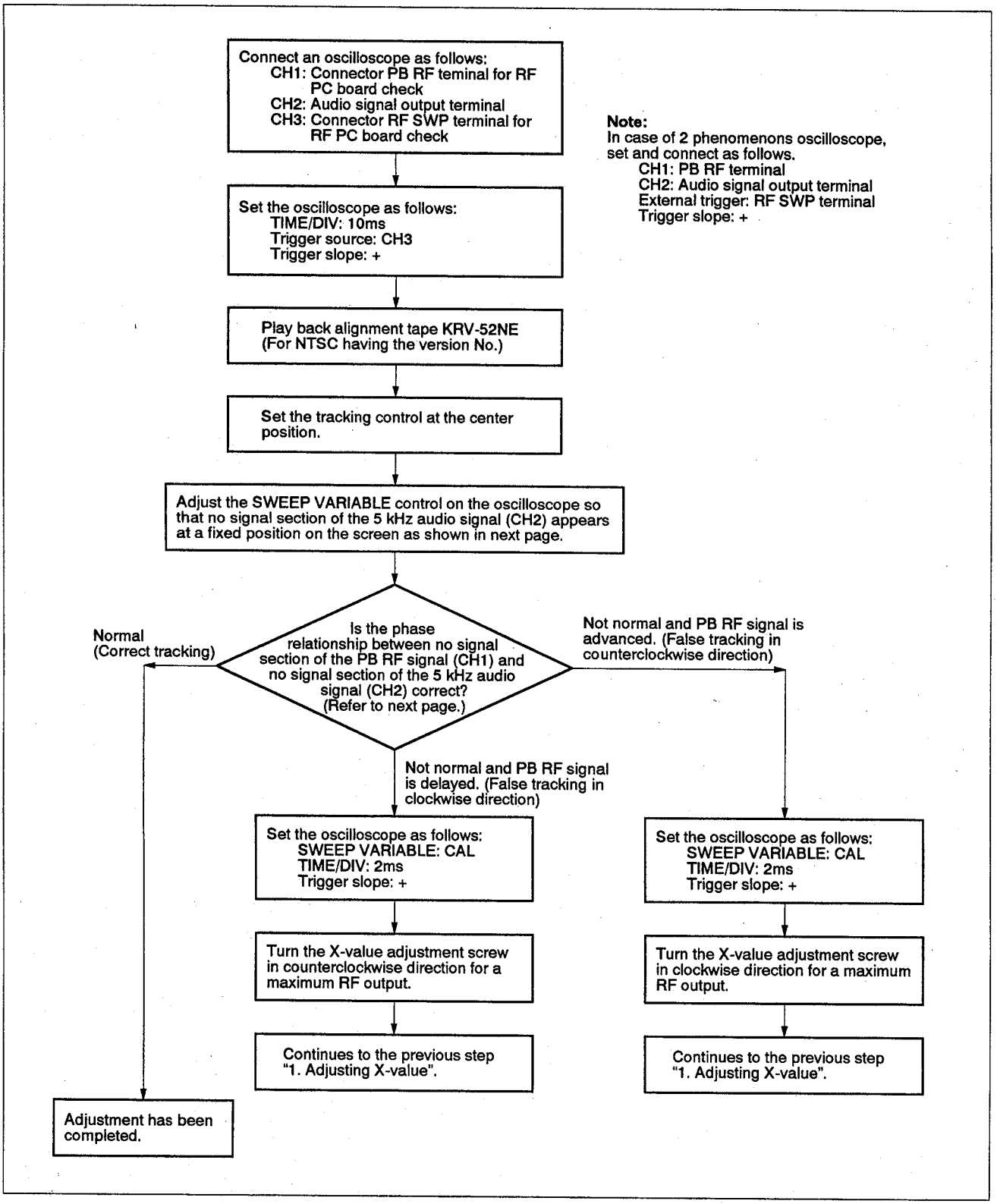
[Adjustment Method]

Set the tracking control at the center position. For the VCRs equipped with narrow gap video heads, set the X-value adjustment screw where a maximum RF output is obtained. For the VCRs equipped with wide gap video heads, set the X-value adjustment screw both where a maximum RF output is obtained and where the RF output decreases immediately when the ▼ tracking control key is pressed.

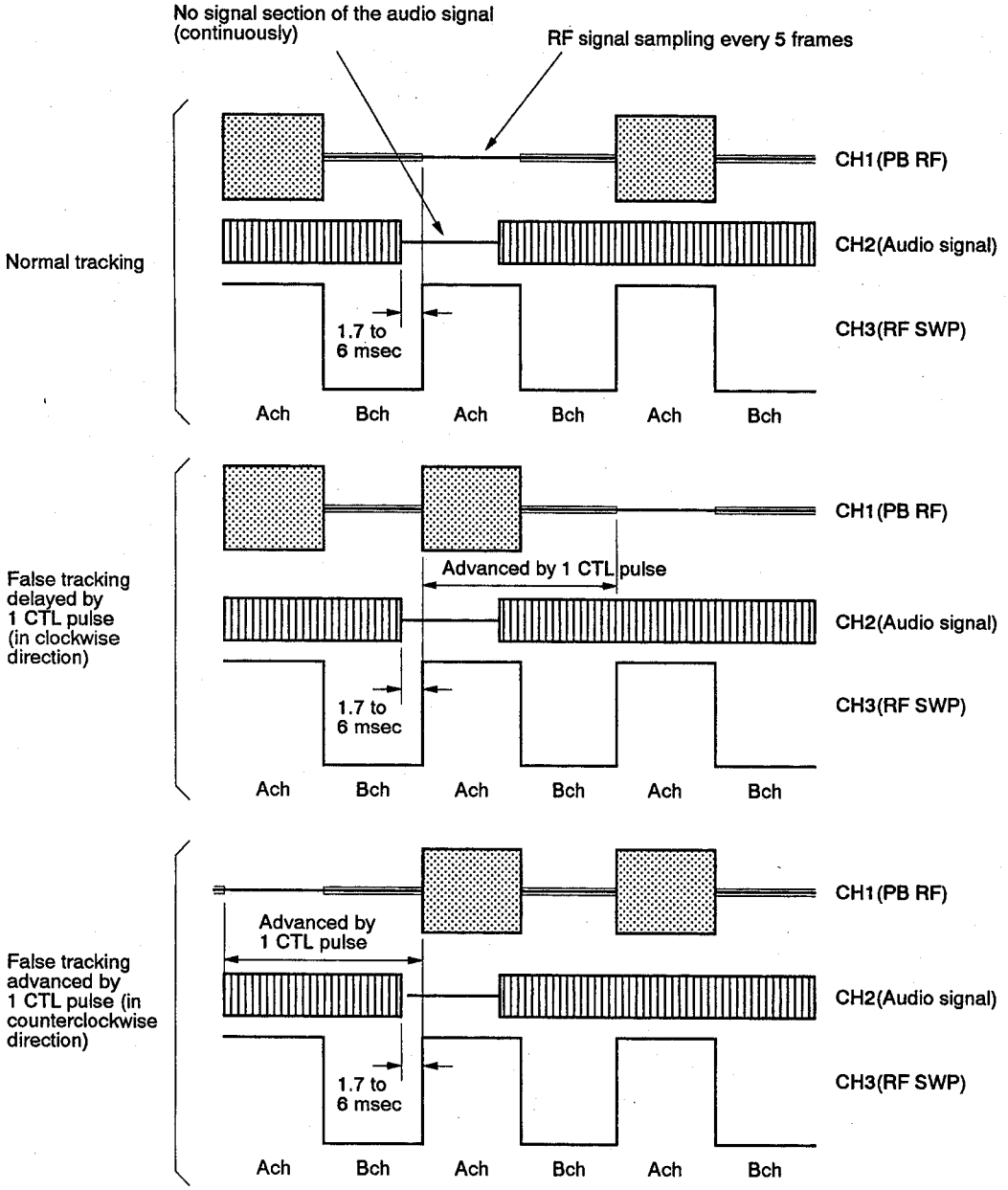
1. Adjusting X-value (Using the tape having the version No.)


Play back alignment tape KRV-52NE (For NTSC)
Using the ▲ and ▼ tracking control keys, move the tracking control point, and check the control range where the maximum RF output can be obtained.
The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
Is the RF output maximum with the tracking control set at the center position?
Yes
No
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
No
Set the tracking control at the center position.
Turn the X-value adjustment screw for a maximum RF
Set the tracking control at the center position.
Turn the X-value adjustment screw for a maximum RF
Turn the X-value adjustment screw in counterclockwise direction, and set it at the position where the RF output is about to decrease.
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
No
Yes
Continues to the next step "2. Checking pitch off".
Continued from the next step "2. Checking pitch off".
Continues to the next step "2. Checking false tracking".
Continued from the next step "2. Checking false tracking".

2. Checking false tracking (Using the tape having the version No.)


Connect an oscilloscope as follows:
CH1: Connector PB RF teminal for RF PC board check
CH2: Audio signal output terminal
CH3: Connector RF SWP terminal for RF PC board check
Note:
In case of 2 phenomenons oscilloscope, set and connect as follows.
CH1: PB RF terminal
CH2: Audio signal output terminal
External trigger: RF SWP terminal
Trigger slope: +
Set the oscilloscope as follows:
TIME/DIV: 10ms
Trigger source: CH3
Trigger slope: +
Play back alignment tape KRV-52NE (For NTSC having the version No.)
Set the tracking control at the center position.
Adjust the SWEEP VARIABLE control on the oscilloscope so that no signal section of the 5 kHz audio signal (CH2) appears at a fixed position on the screen as shown in next page.
Is the phase relationship between no signal section of the PB RF signal (CH1) and no signal section of the 5 kHz audio signal (CH2) correct? (Refer to next page.)
Normal (Correct tracking)
Not normal and PB RF signal is advanced. (False tracking in counterclockwise direction)
Not normal and PB RF signal is delayed. (False tracking in clockwise direction)
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Turn the X-value adjustment screw in counterclockwise direction for a maximum RF output.
Continues to the previous step "1. Adjusting X-value".
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Turn the X-value adjustment screw in clockwise direction for a maximum RF output.
Continues to the previous step "1. Adjusting X-value".
Adjustment has been completed.

Using the tape having the version No.



2-3. ADJUSTING THE MECHANISM USING ALIGNMENT TAPE (KRV-52NE for NTSC)

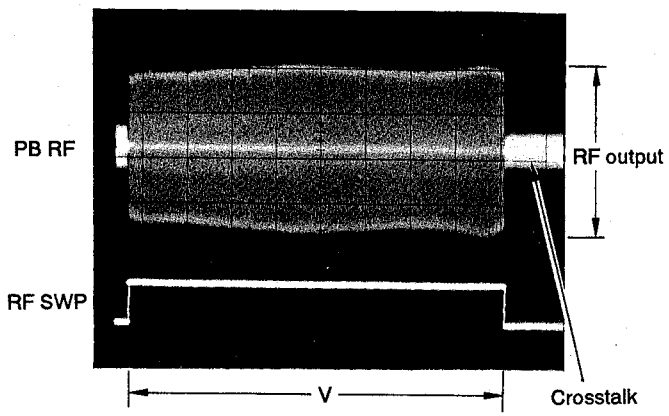
2-3-1. HEIGHT ADJUSTMENT OF GUIDE ROLLERS NO. 3 AND NO. 6

Mode	Playback
Signal	Alignment tape KRV-52NE (For NTSC)
Measuring instrument	Oscilloscope TIM/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH-1: Connector PB RF pin for RF PC board check CH-2: Connector RF SWP pin for RF PC board check
Adjustment locations	Height adjustment screw for No.3 tape guide roller Height adjustment screw for No.6 tape guide roller

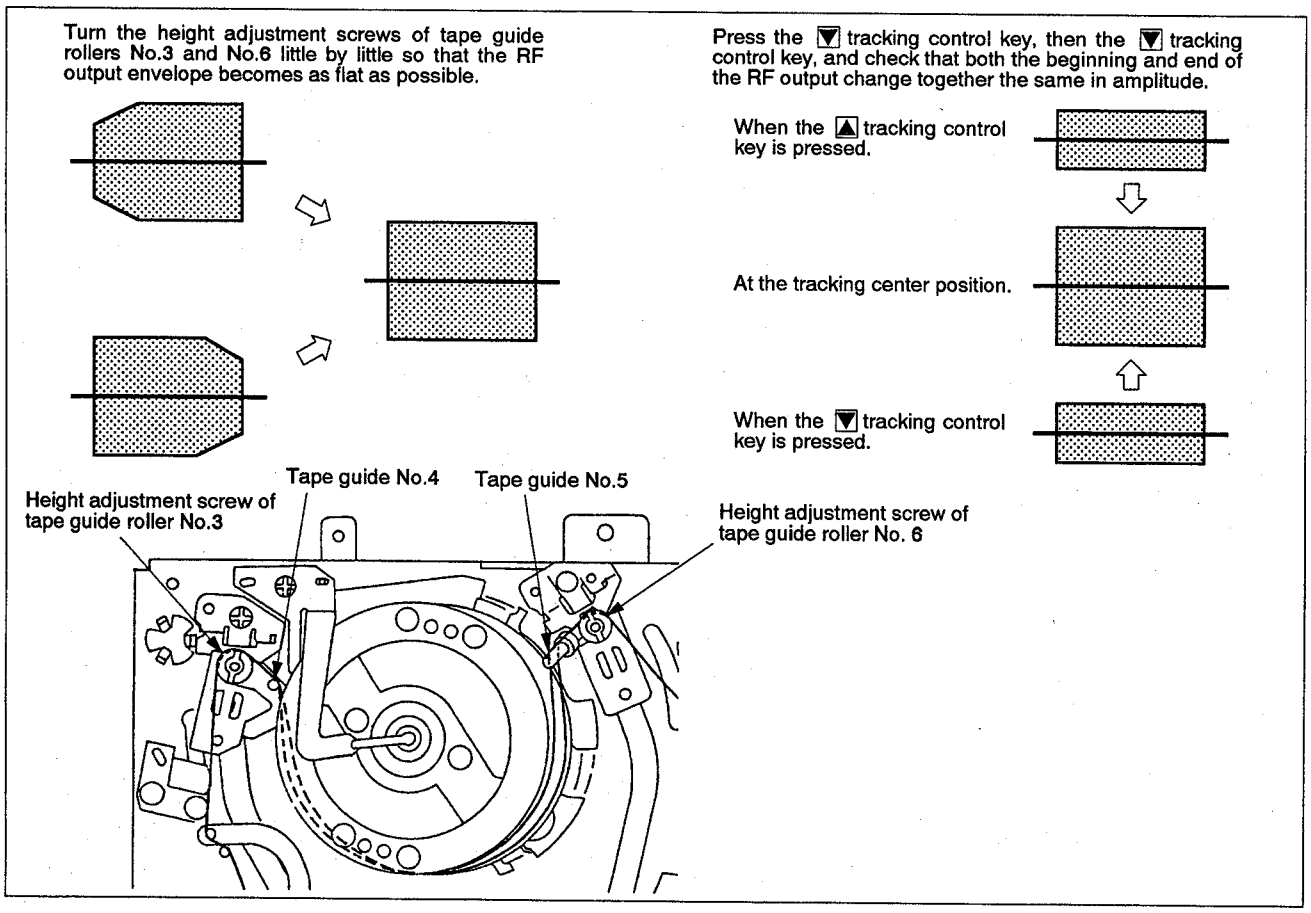
[Adjustment Method]

The following adjustment shall be carried out after completed Section 2-1-1 "X-value adjustment and check".

1) Deactivate the automatic tracking control, and set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).
2) Check if the RF output changes in amplitude by pressing the tracking control key. The RF output should change periodically (changes from a minimum amplitude to a maximum amplitude, and to the minimum amplitude again).



3) Turn the height adjustment screws of tape guide rollers No.3 and No.6 so that the RF output envelope becomes as flat as possible.
4) Press the ▲ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.
5) Press the ▼ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.


Turn the height adjustment screws of tape guide rollers No.3 and No.6 little by little so that the RF output envelope becomes as flat as possible.
Press the ▼ tracking control key, then the ▼ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.
When the ▲ tracking control key is pressed.
At the tracking center position.
When the ▼ tracking control key is pressed.
Tape guide No.4
Tape guide No.5
Height adjustment screw of tape guide roller No.3
Height adjustment screw of tape guide roller No. 6

2-3-2. ACE HEAD ASSEMBLY ADJUSTMENT (ROUGH ADJUSTMENT) (Figs. 2-1 and 2-2)

Purpose: Allows the tape to make even contact with the head for recording and playback of the specified track.

Mode	Playback
Jig	Blank tape
Adjustment locations	Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Mount the ACE head assembly. At this time, adjust the height so that the height of guide flange No. 7 matches the level of the lower edge of the control head.
2) Remove the adjustment tool and load a new tape, then set the unit for playback.
3) Check that the tape does not curl or rise up noticeably near the ACE head.
4) If the tape curls up or rises noticeably, readjust the tilt adjuster screw and the height adjuster nut.
   (The height of the ACE head should be adjusted so that the lower edge of the tape is approx. 0.1 to 0.15 mm from the control head.)
5) Perform precision adjustment.

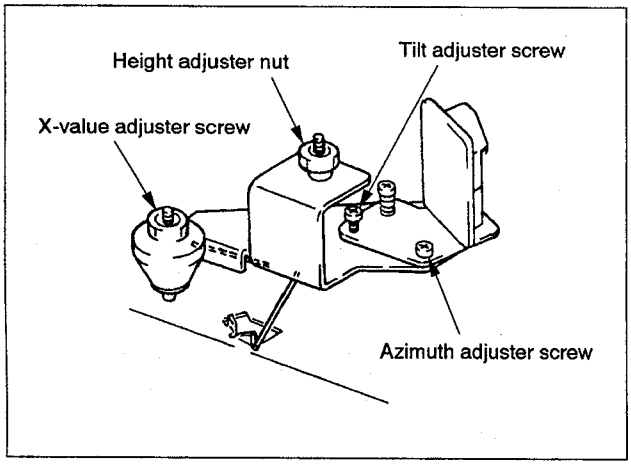


Fig. 2-1

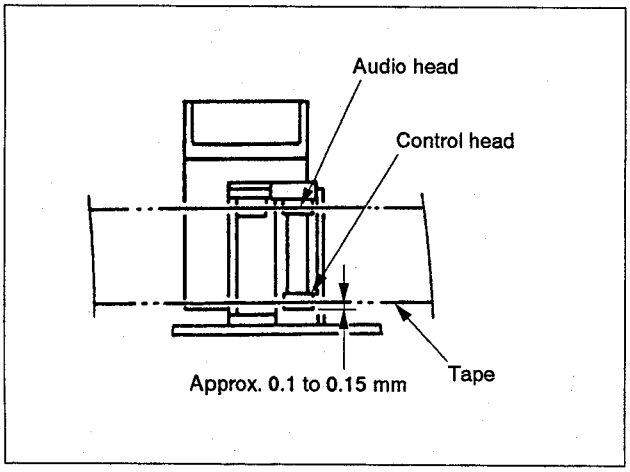


Fig. 2-2

2-3-3. ACE HEAD ASSEMBLY ADJUSTMENT (PRECISION ADJUSTMENT)

Mode	Playback
Signal	Alignment tape (KRV-52NE 5 kHz) (For NTSC)
Measuring instrument	Oscilloscope
Measuring point	Audio output terminal
Adjustment locations	Azimuth adjuster screw, Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Adjust the tilt adjuster screw in the FWD or REV mode so that the lower flange of guide No. 7 does not curl up or rise.
2) Alternately adjust the azimuth adjuster screw, the height adjuster nut, and the tilt adjuster screw to maintain even audio output at maximum with minimum deviation.

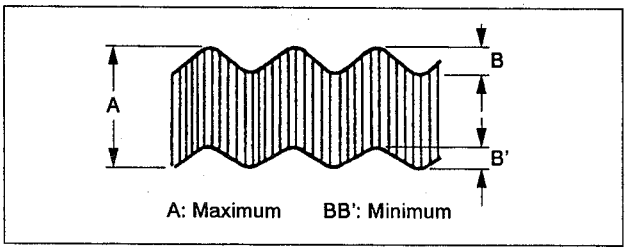


Fig. 2-3

2-3-4. ADJUSTMENTS AFTER REPLACING THE DRUM (VIDEO HEAD)

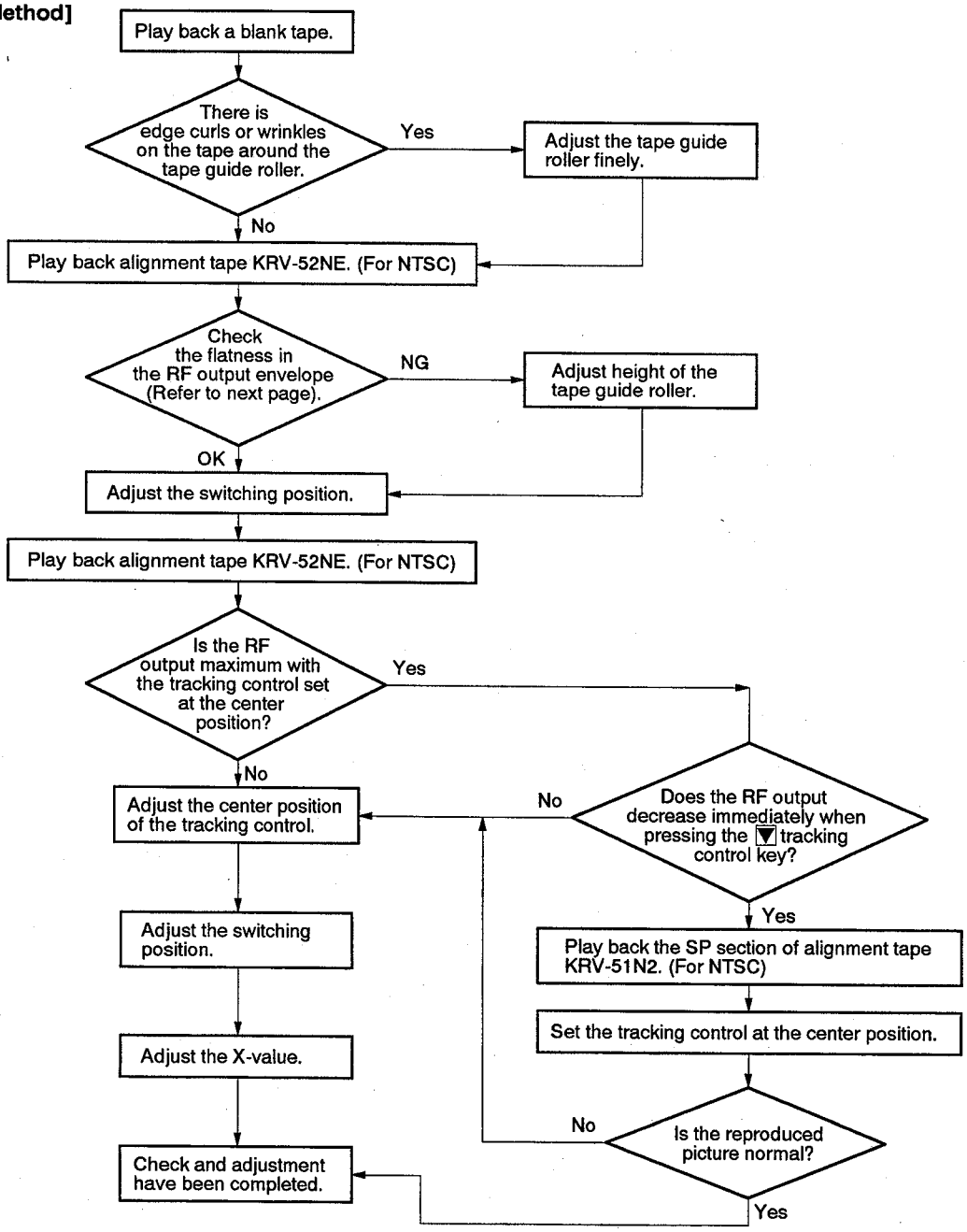
Purpose: Co-relative height, X-value and other factors of the drum will deviate from those of the guide roller. If the drum is replaced properly, these deviations are extremely small.

Note 1: Deactivate the automatic tracking control for setting the mechanism in manual tracking control mode.

Note 2: To set the tracking control at the center position, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

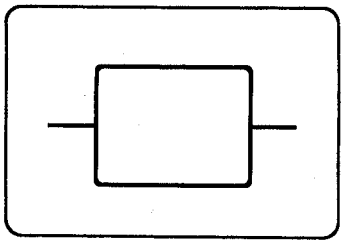
Mode	Playback
Signal	Alignment tape KRV-52NE (For NTSC), blank tape
Measuring instrument	Oscilloscope
Measuring point	CH-1: Connector PB RF pin for RF PC board check. CH-2: Connector RF SWP pin for RF PC board check.
Adjustment locations	Guide roller (Refer to 2-3-1.) Switching position (Refer to the Service Manual) X-value (Refer to 2-1-1, 2-1-2.)

[Adjustment Method]

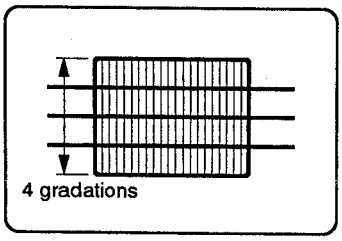

Play back a blank tape.
There is edge curls or wrinkles on the tape around the tape guide roller.
Yes
Adjust the tape guide roller finely.
No
Play back alignment tape KRV-52NE. (For NTSC)
Check the flatness in the RF output envelope (Refer to next page).
NG
Adjust height of the tape guide roller.
OK
Adjust the switching position.
Play back alignment tape KRV-52NE. (For NTSC)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
Adjust the center position of the tracking control.
No
Does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
Play back the SP section of alignment tape KRV-51N2. (For NTSC)
Set the tracking control at the center position.
Adjust the switching position.
Adjust the X-value.
No
Is the reproduced picture normal?
Yes
Check and adjustment have been completed.

[Checking the evenness and fluctuation of the RF output]

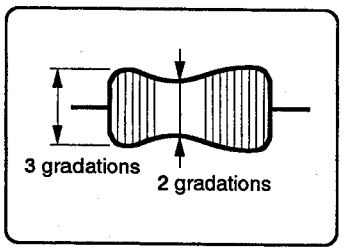
1) Set the RF output to the maximum level using the tracking buttons.



2) Perform fine adjustment of the voltage level range of the oscilloscope, then adjust the RF output deviation to within 4 gradations.



3) Press the tracking buttons and adjust the maximum amplitude of the RF output to within 3 gradations.
4) At this time, check if the minimum amplitude is more than 2 gradations.



5) Check that the RF output fluctuation between minimum and maximum levels is within 13%.

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Home A&V Products Div.

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Quality Engineering Dept.

VHS MECHANICAL ADJUSTMENT MANUAL IV

SONY®
SERVICE MANUAL

H MECHANISM

SUPPLEMENT-2

File this supplement with the VHS mechanical adjustment IV and supplement-1.

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1. CORRECTION

In the VHS Mechanism Adjustment Manual IV (Supplement-1), an adjustment sequence was wrong, and it is corrected as follow;

1-1. Adjustment Sequence (VHS Mechanism Adjustment Manual IV (Supplement-1) Page 6 to 11)

(1) Adjustment of No. 3 and No. 6 guide roller height

Delete the "The following adjustment shall be carried out after completed Section 2-1-1 "X-value adjustment and check" under "Adjustment Method" on page 10.

(2) Adjustment of ACE head assembly

Note: In the adjustment of ACE head assembly (coarse adjustment and fine adjustment), if a azimuth, height and tilt were adjusted, again adjust the height of No. 3 and No. 6 guide rollers.

(3) Adjustment of X value

MICROFILM

2. MODIFICATION

2-1. CHANGING THE RECORDED CONTENTS OF ALIGNMENT TAPE

KRV-52NE (NTSC) (Ver. 1.2)

Time	Video	Audio
20 min.	Recording only at 1 MHz, A-ch. EP mode RF skipping once per 5 frames	5 kHz → 4 kHz full tracks

2-2. TG2 ROLLER, FE HEAD ASSEMBLY (Refer to VHS Mechanical Adjustment Manual IV page14)

- The TG2 roller is provided with either of two types, fixed or straight. For the fixed type, section 3-5 is added.

3-5. TG2 ROLLER, FE HEAD ASSEMBLY (Fig. 3-5)

1) Remove screw ① to pull out FE head assembly ②.

[Note on Mounting]

- Keep clean the surface contacts tape of TG2 roller.

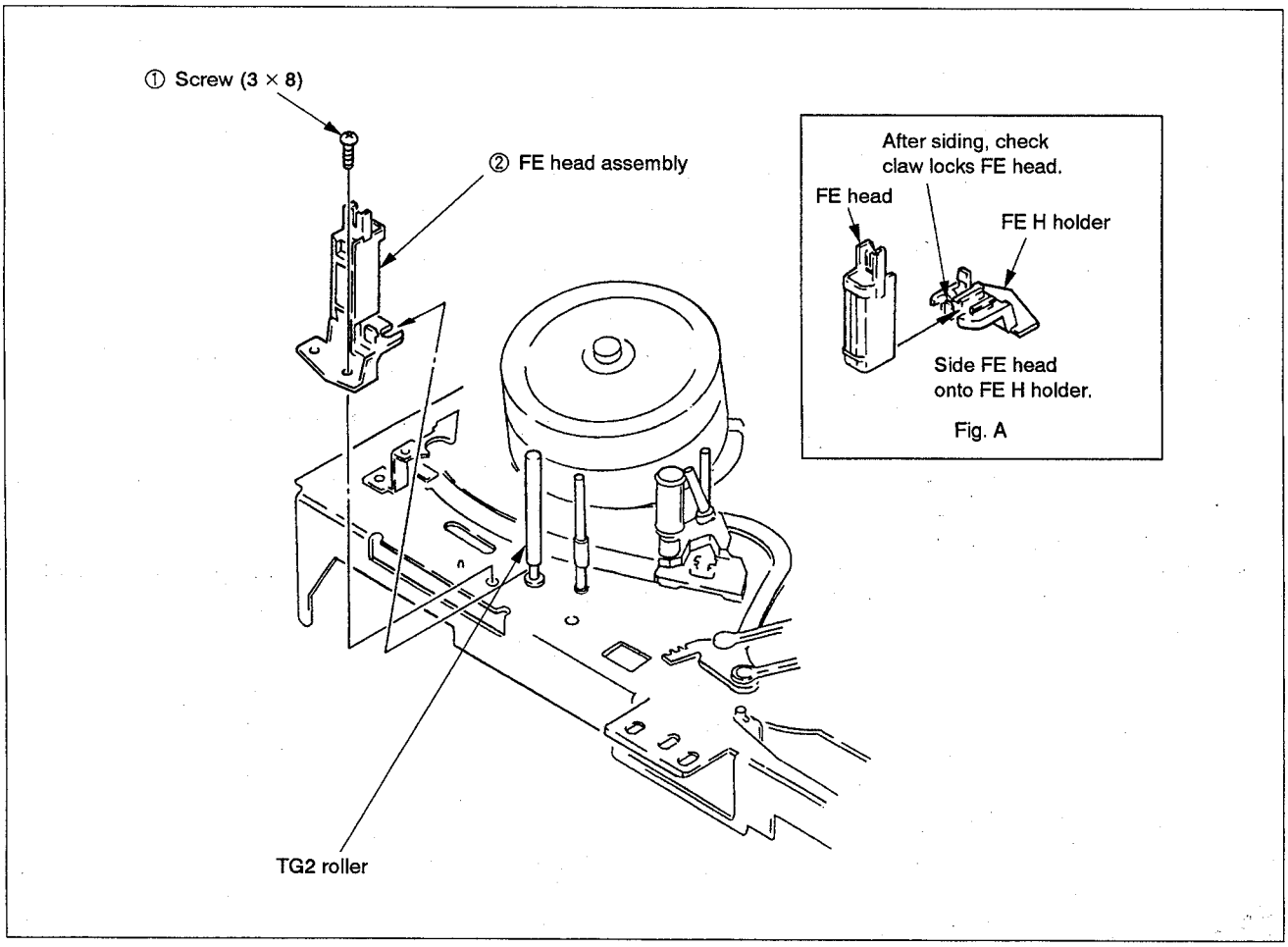
① Screw (3 × 8)
② FE head assembly
TG2 roller
After siding, check claw locks FE head.
FE head
FE H holder
Side FE head onto FE H holder.
Fig. A

Fig. 3-5

2-3. TG3, TG6 GUIDE ROLLER ASSEMBLIES (Refer to VHS Mechanical Adjustment Manual Ⅳ page 17)

- There is another type in TG3 and TG6 guide roller assemblies, which is not attached with a screw (B2X3). For the screwless type, section 3-8 is added.

3-8. TG3, TG6 GUIDE ROLLER ASSEMBLIES (Fig. 3-8)

1) TG3 guide roller assembly ① by turning it in arrow Ⓐ direction.
2) Removal the spring ②.
3) TG6 guide roller assembly ③ by turning it in arrow Ⓑ direction.
4) Removal the spring ④.

[Note on Mounting]

- Keep clean the surface contacts tape of TG3 and TG6 guide roller assemblies ①, ③.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

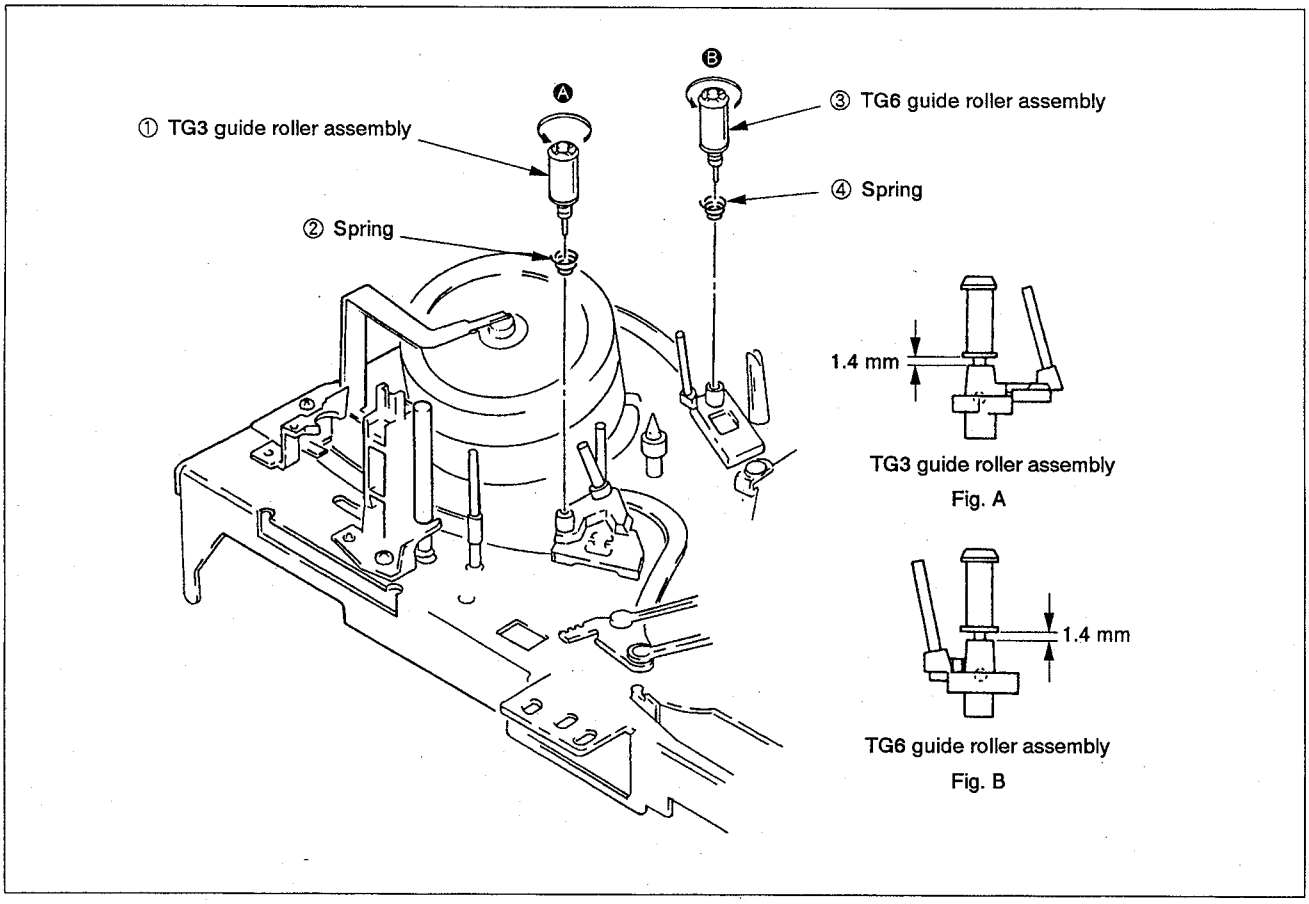

Fig. 3-8

2-4. TG8 ASSEMBLY (Refer to VHS Mechanical Adjustment Manual Ⅳ page 23)

- As the shape of TG8 assembly was changed, Section 3-13 is changed.

☛ : Chenged portion

3-13. TG8 ASSEMBLY (Fig. 3-15)

1) Remove TG7 tape retainer ① to pull out TG8 assembly ②.

[Note on Mounting]

- Apply FLOIL SG-055G (Jig Ref. No. J-12) to ☆ marked portion.
- Keep clean the surface contacts tape of TG8 assembly ②.
- Be careful not to change the shape of TG7 tape retainer ①.
- After attaching the TG7 tape retainer ①, check that side Ⓐ of ① is below side Ⓑ of the stepped-part of the TG7 shaft. (Fig. A)

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

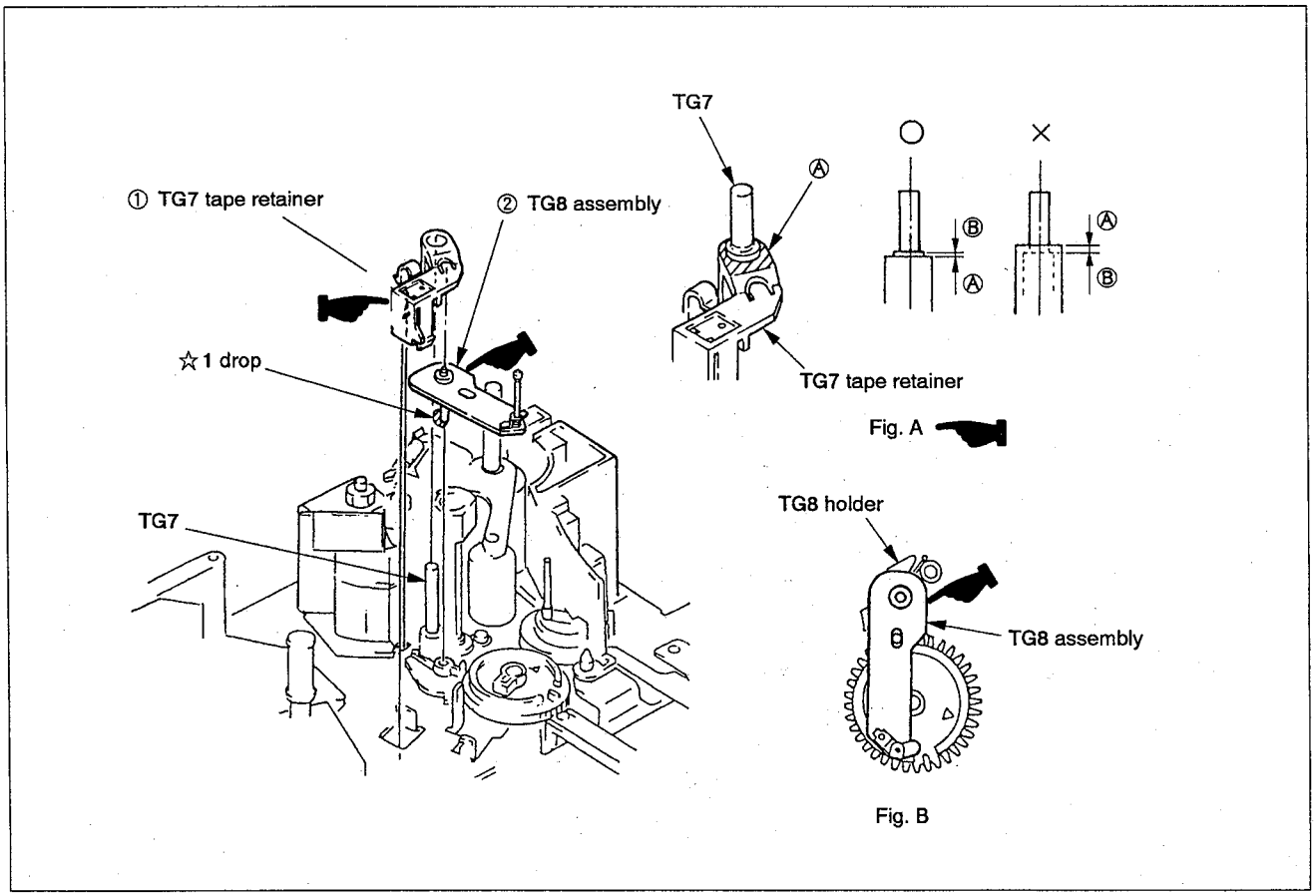

Fig. 3-15

2-5. TENSION REGULATOR (TG1) POSITION/ TENSION ADJUSTMENT (Refer to VHS Mechanical Adjustment Manual Ⅳ page 35)

- As the tension regulator position and tension adjustment were changed, the tension adjustment and Fig. 4-1 are changed.

☛ : Changed portion

• Tension adjustment

Mode	Playback
Measuring instrument/tool	Torque cassette
Adjustment locations	Position for hooking the tension spring
Specified value	34 ± 4 g•cm ☛

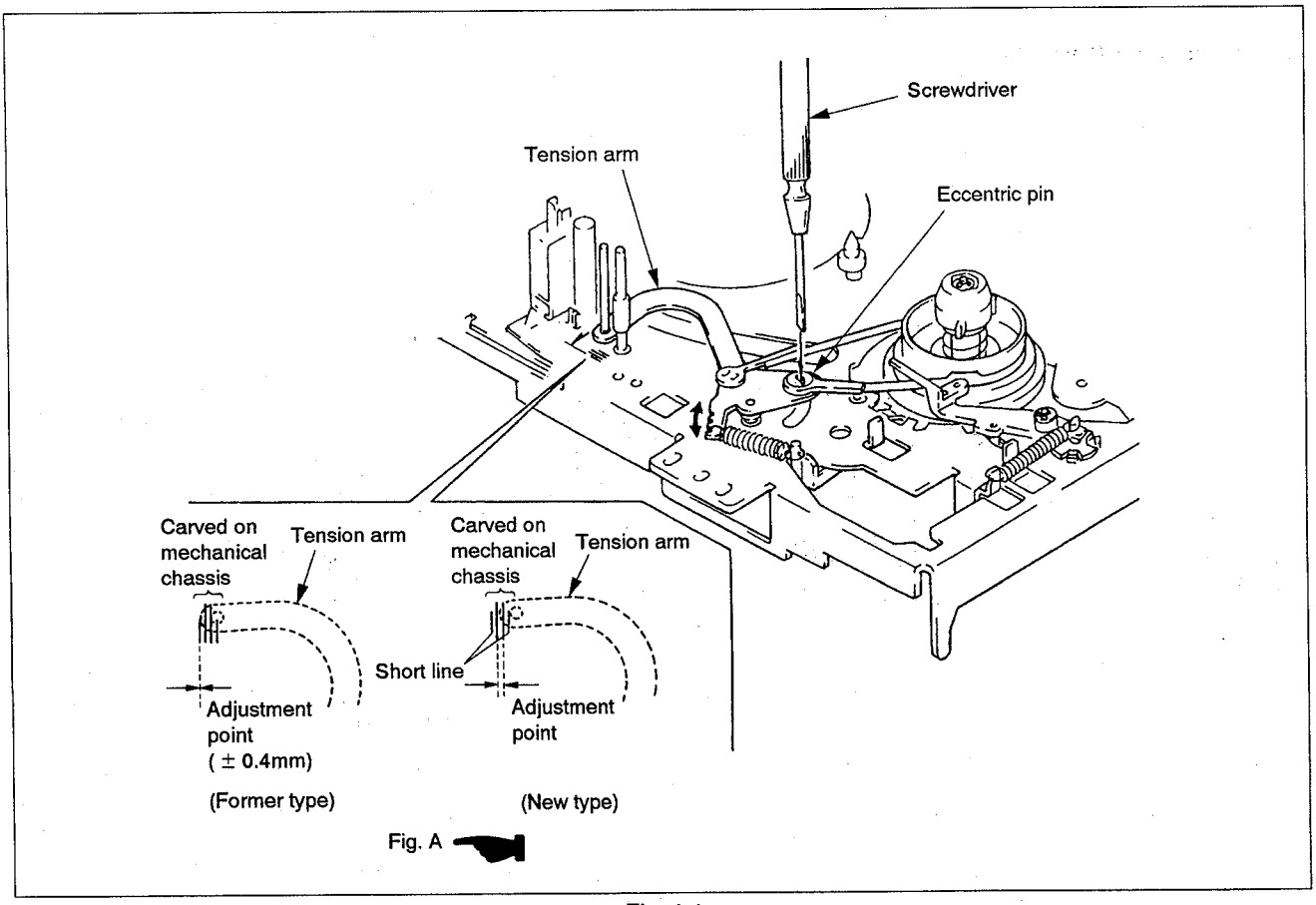

Fig. 4-1

2-6. TG8 GUIDE ROLLER HEIGHT ADJUSTMENT (Refer to VHS Mechanical Adjustment Manual IV page 36)

- As the use of TG8 height adjusting screw was cancelled, section 4-1-2 is changed.

4-1-2. TG7 TAPE PATH ADJUSTMENT (Fig. 4-2)

[Adjustment Method]

1) Load a tape, and playback the tape in the CUE mode, confirm the distance between lower flange of No. 7 guide roller and lower side of tape (Fig. A).
2) Then, feeding the tape in the REV mode, confirm the distance between lower flange of No. 7 guide roller and lower side of tape.
3) If the tape height in the REV feed is higher that in the CUE playback (Fig. B), rotate the ACE head flapping adjust screw in the direction Ⓐ so that a difference in tape height between CUE mode and REV mode becomes zero.
4) If the tape height in the REV feed is lower that in the CUE playback (Fig. C), rotate the ACE head flapping adjust screw in the direction Ⓑ so that a difference in tape height between CUE mode and REV mode becomes zero.

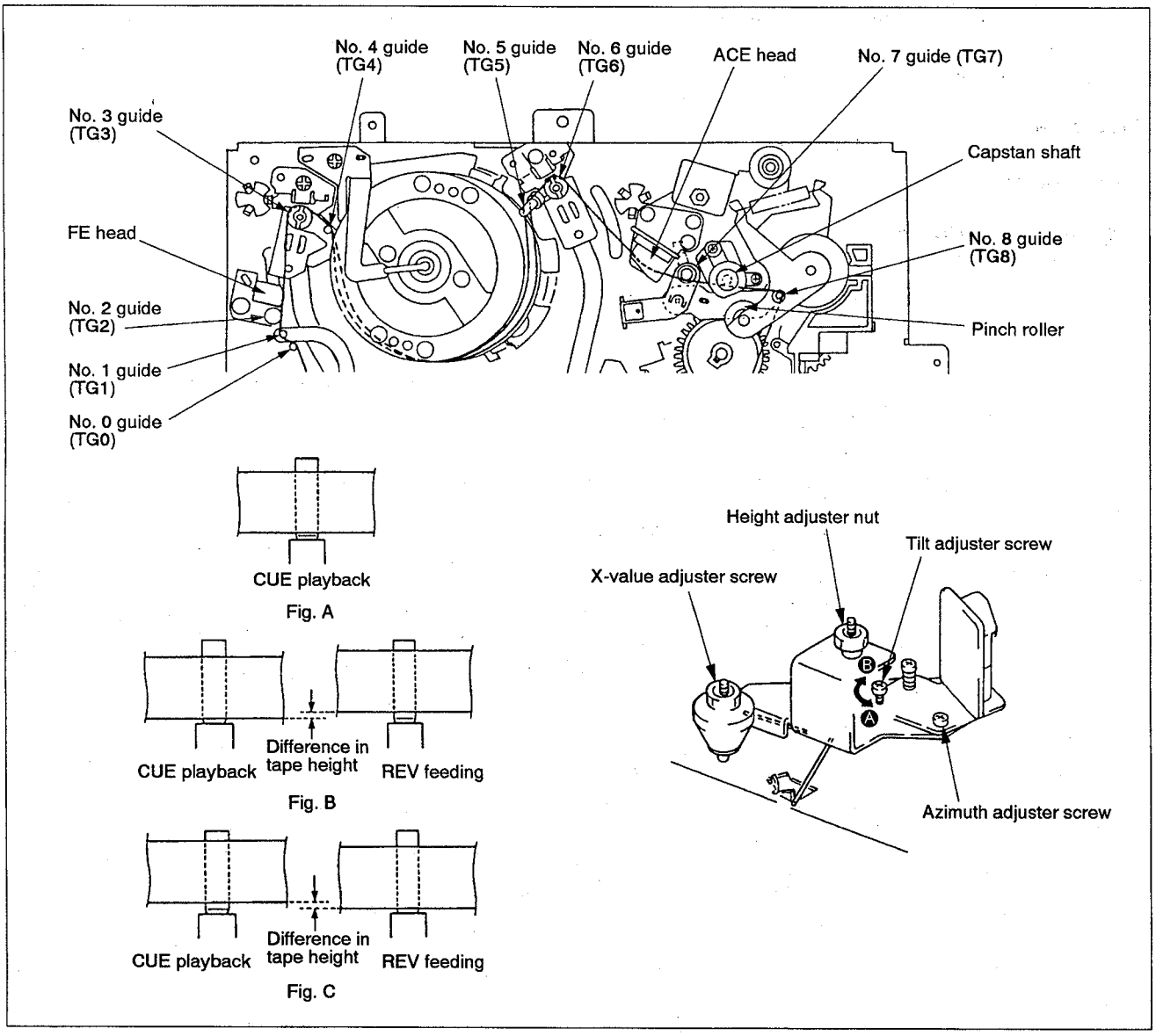

Fig. 4-2

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VHS MECHANICAL ADJUSTMENT MANUAL IV

SONY

H MECHANISM

SERVICE MANUAL

SUPPLEMENT-3

File this supplement with the VHS mechanical adjustment IV and supplement-1, 2.

Subject: Mechanism chassis assembly changed.
PAL alignment tape changed.

(SL-600060)

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1. MODIFICATION

1-1. PARTS REQUIRING CLEANING (Refer to VHS Mechanical Adjustment Manual IV page 7)

- Parts requiring a cleaning were changed in shape, and therefore, Fig. 2-1 for new type is added.

☛: Modificated portion

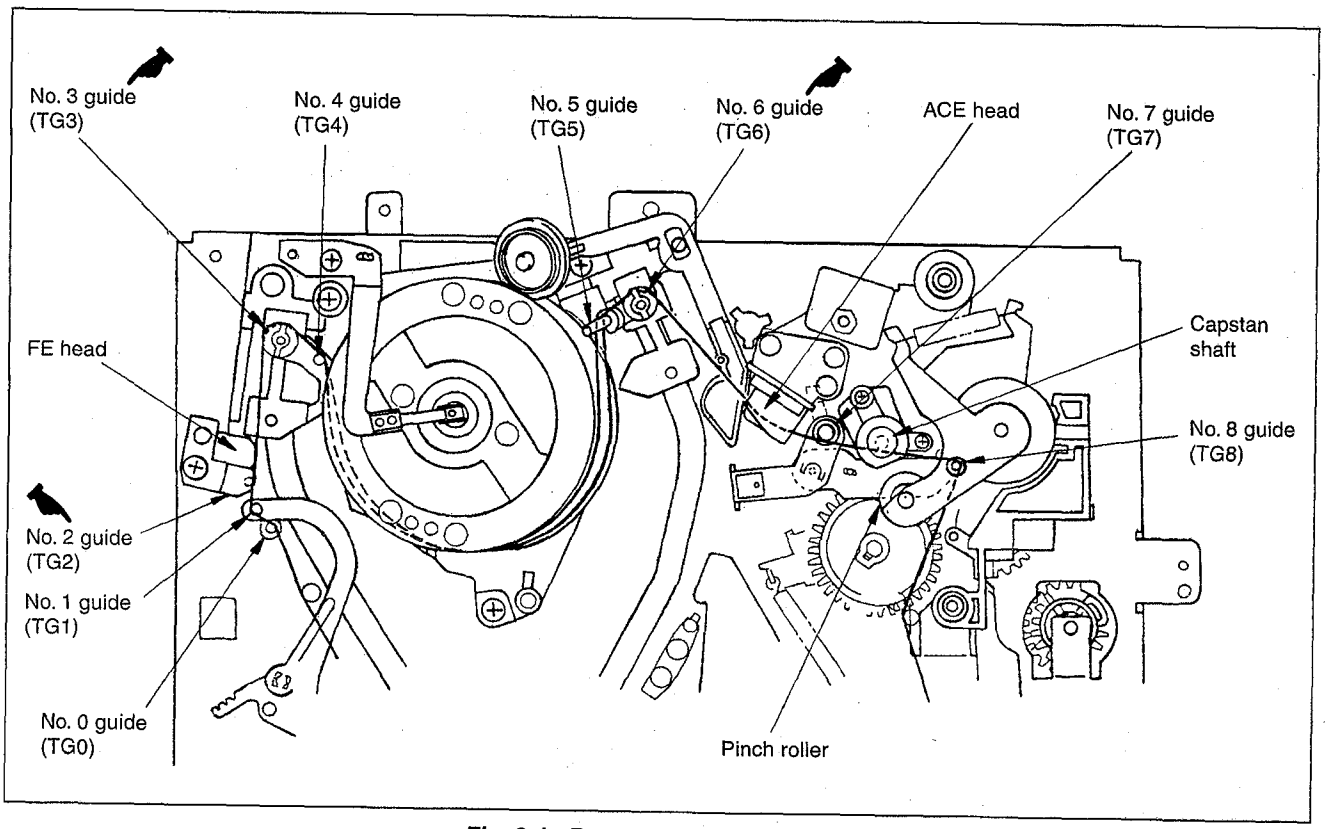


Fig. 2-1 Parts Requiring Cleaning

1-2. DRUM ASSEMBLY, DRUM BASE (Refer to VHS Mechanical Adjustment Manual IV page 11)

- The ground shaft assembly was changed and the drum base was added, and therefore Section 3-2 for new type is added.

3-2. DRUM ASSEMBLY, DRUM BASE (Fig. 3-2)

1) Remove screw ①.
2) Remove ground shaft assembly ② not to touch its tip with bare hand or tools.
3) Remove screws ③ to remove drum assembly ④.
4) Remove screws ⑤ to remove drum base ⑥.

[Note on Mounting]

- Don't touch head chips and ground shaft assembly ④ with bare hand or tools.
- Keep clean the surface contacts tape of drum assembly ④.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

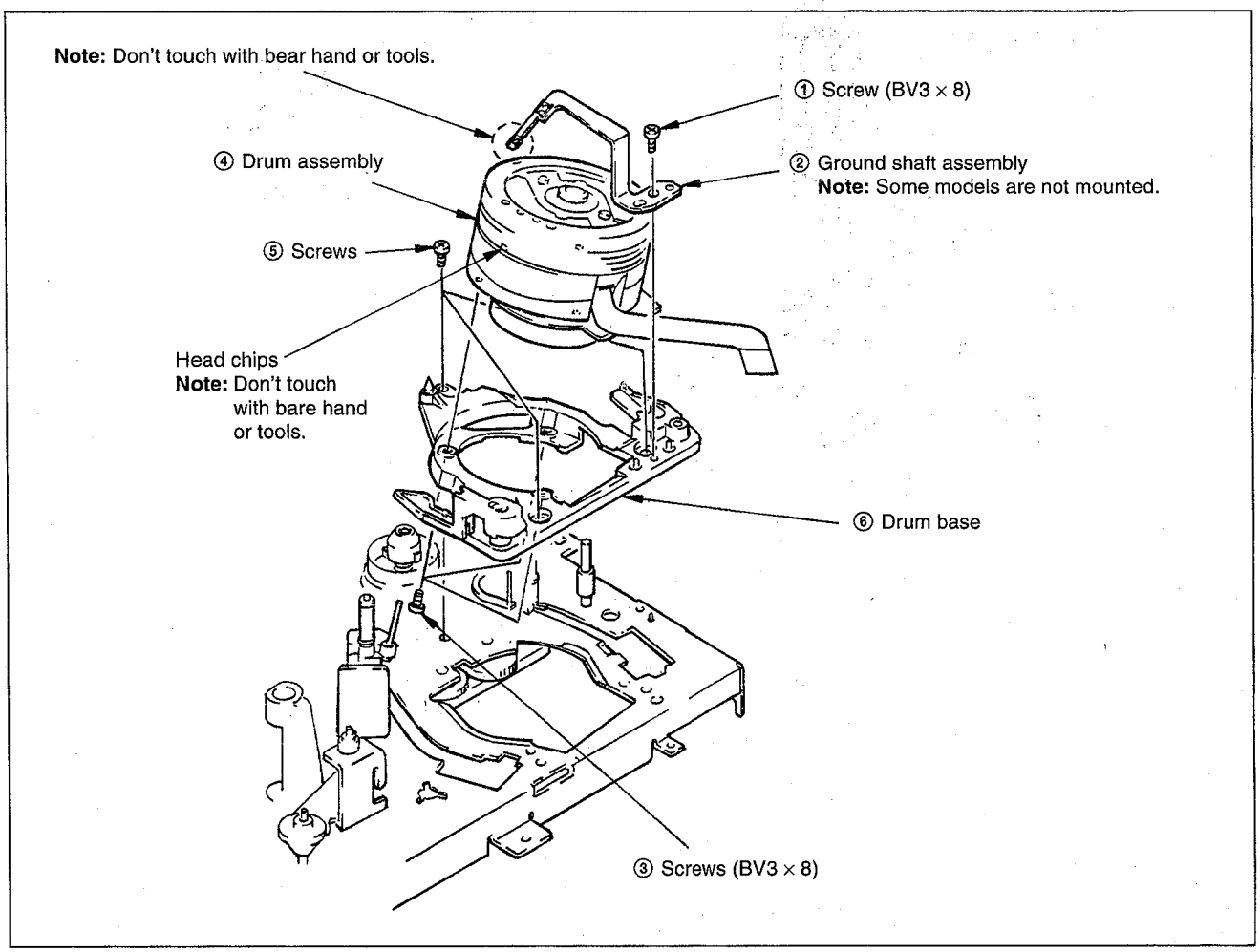

Note: Don't touch with bear hand or tools.
① Screw (BV3 × 8)
④ Drum assembly
② Ground shaft assembly
Note: Some models are not mounted.
⑤ Screws
Head chips
Note: Don't touch with bare hand or tools.
⑥ Drum base
③ Screws (BV3 × 8)

Fig. 3-2

1-3. TG2 ROLLER, FE HEAD ASSEMBLY (Refer to VHS Mechanical Adjustment Manual IV page 14)

- The TG2 roller was assembled in the FE head assembly, and therefore Section 3-5 for new type is added.

3-5. TG2 ROLLER, FE HEAD ASSEMBLY (Fig. 3-5)

1) Remove screw ①.
2) Pull out FE head assembly ②.

[Note on Mounting]

- Keep clean the surface contacts tape of TG2 roller.

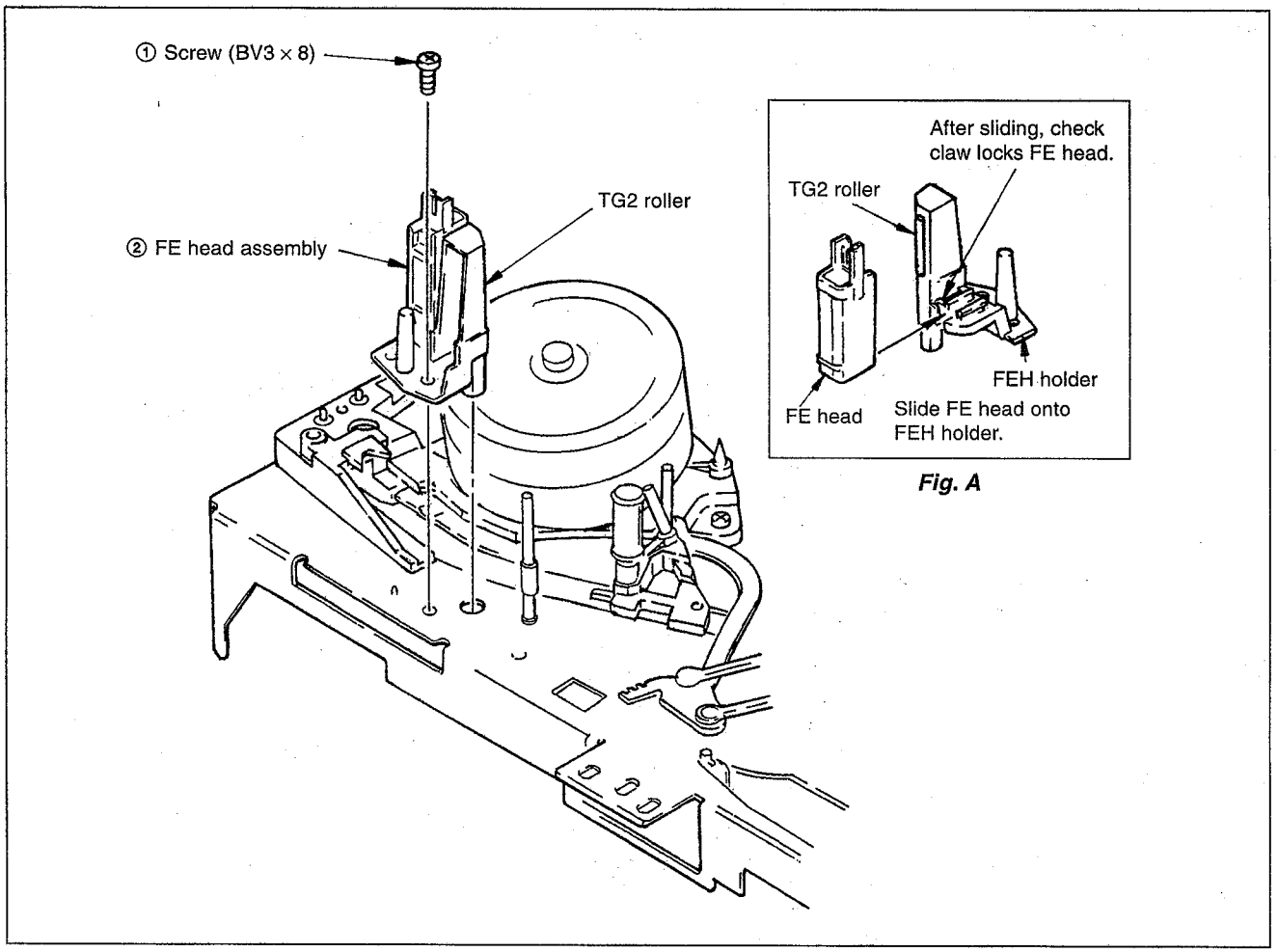


Fig. A

Fig. 3-5

1-4. TG3, TG6 GUIDE ROLLER ASSEMBLIES (Refer to VHS Mechanical Adjustment Manual IV page 17)

- The TG3 and TG6 guide roller assemblies were changed, and therefore Section 3-8 for new type is added.

3-8. TG3, TG6 GUIDE ROLLER ASSEMBLIES (Fig. 3-8)

1) TG3 guide roller assembly ① by turning it in the arrow Ⓐ direction.
2) Removal the spring ②.
3) TG6 guide roller assembly ③ by turning it in the arrow Ⓑ direction.
4) Removal the spring ④.

[Note on Mounting]

- Keep clean the surface contacts tape of TG3 and TG6 guide roller assemblies ①, ③.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

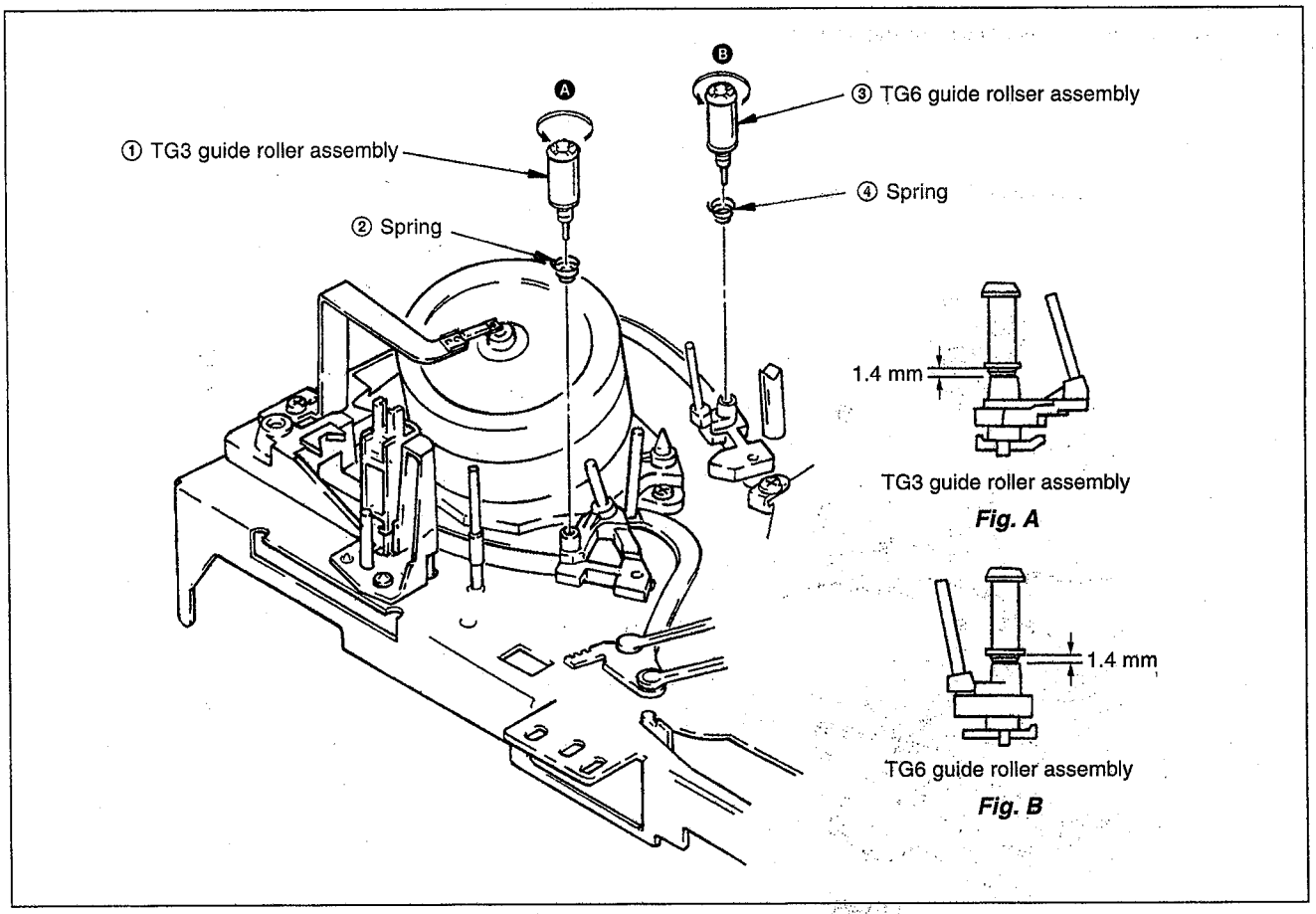


Fig. 3-8

1-5. SHUTTLE T BLOCK AND LOADING GEAR T BLOCK ASSEMBLIES (Refer to VHS Mechanical Adjustment Manual IV page 29)

- The shuttle T block and loading gear T block assemblies were changed, and therefore Section 3-19 for new type is added.

3-19. SHUTTLE T BLOCK AND LOADING GEAR T BLOCK ASSEMBLIES (Fig. 3-21)

1) Remove drum assembly and drum base. (Refer to 3-2.)
2) Remove timing belt. (Refer to 3-3.)
3) Remove CAP brake assembly. (Refer to 3-4.)
4) Remove cam motor chassis block assembly. (Refer to 3-18.)
5) Remove main slider. (Refer to 3-20.)
6) Sliding the shuttle T block assembly ① toward the direction Ⓐ, remove it through the hole Ⓑ.
7) Pull out loading gear T block assembly ②.

[Note on Mounting]

- Adjust the phase Ⓒ between loading gear (T) and loading gear (S). (Fig. A)
- Keep clean the surface contacts tape of shuttle T block assembly ①.

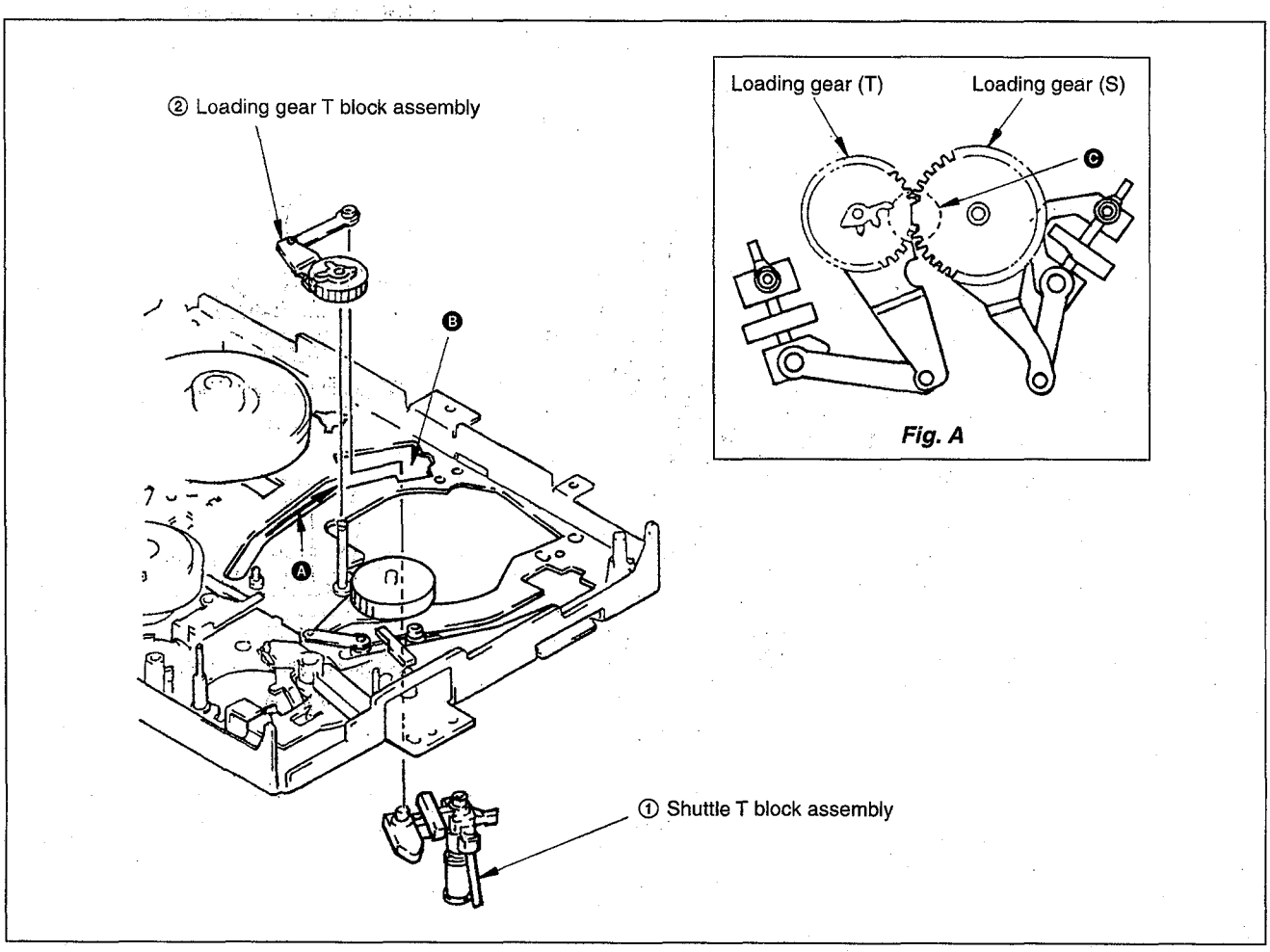


Fig. A

Fig. 3-21

1-6. SHUTTLE S BLOCK AND LOADING GEAR S BLOCK ASSEMBLIES (Refer to VHS Mechanical Adjustment Manual IV page 30)

- The shuttle S block and loading gear S block assemblies were changed, and therefore Section 3-20 for new type is added.

3-20. SHUTTLE S BLOCK AND LOADING GEAR S BLOCK ASSEMBLIES (Fig. 3-22)

1) Remove drum assembly and drum base. (Refer to 3-2.)
2) Remove timing belt. (Refer to 3-3.)
3) Remove CAP brake assembly. (Refer to 3-4.)
4) Remove cam motor chassis block assembly. (Refer to 3-18.)
5) Remove main slider. (Refer to 3-20.)
6) Sliding the shuttle S block assembly ① toward the direction Ⓐ, remove it through the hole Ⓑ.
7) Pull out loading gear S block assembly ②.

[Note on Mounting]

- Adjust the phase Ⓒ between loading gear (S) and loading gear (S). (Fig. A)
- Keep clean the surface contacts tape of shuttle S block assembly ①.

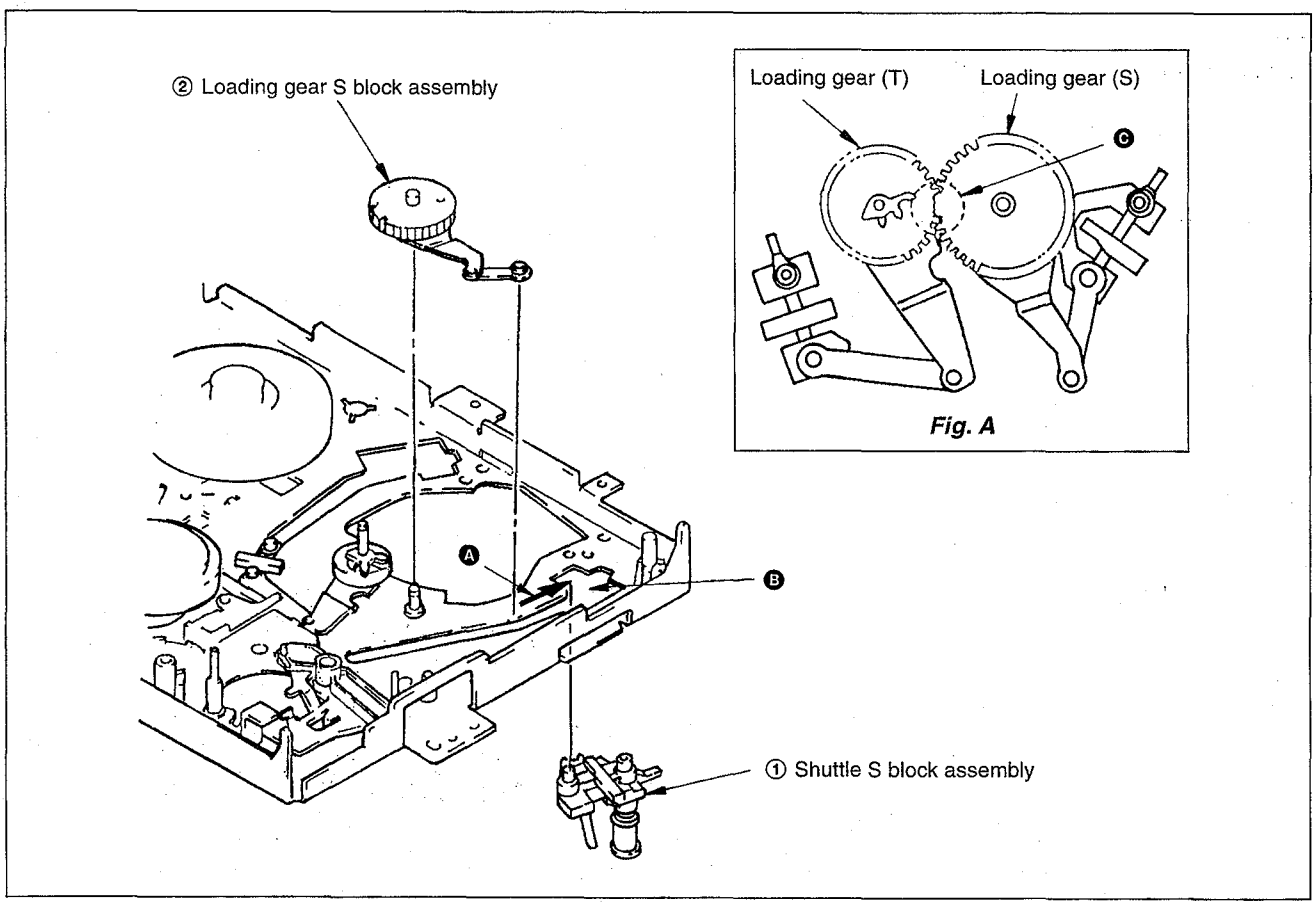


Fig. A

Fig. 3-22

2. ADJUSTING THE MECHANISM USING NEW ALIGNMENT TAPE (KRV-52PL for PAL)

The conventional alignment tape (For PAL) is now replaced with alignment tape KRV-52PL, and the following describes how to align the mechanism using the KRV-52PL. For details on the use of KRV-51P for each model, refer to the service manuals which will be issued in the future.

Name	Parts No.	Remarks
Alignment tape KRV-52PL for PAL	8-192-605-46	For tape path, audio azimuth, and X-value adjustments
Alignment tape KRV-51P for PAL	8-192-605-36	For electrical adjustments (RF, AF, and switching position) and operation check

Contents:

KRV-52PL (PAL)

Time	Video	Audio
20 min.	Recording only at 1 MHz, A-ch. EP mode RF skipping once per 5 frames	4 kHz full tracks

KRV-51P (PAL)

Class	Mode	Time	Video	Audio (HiFi/Normal)
1	SP	7 min.	Color bar	400 Hz
2	SP	3 min.	Mono. scope	400 Hz
3	EP	7 min.	Color bar	400 Hz
4	EP	3 min.	Mono. scope	400 Hz

2-1. HEIGHT ADJUSTMENT OF GUIDE ROLLERS NO. 3 AND NO. 6

Mode	Playback
Signal	Alignment tape KRV-52PL (For PAL)
Measuring instrument	Oscilloscope TIM/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH-1: Connector PB RF pin for RF PC board check CH-2: Connector RF SWP pin for RF PC board check
Adjustment locations	Height adjustment screw for No. 3 tape guide roller Height adjustment screw for No. 6 tape guide roller

[Adjustment Method]

1) Deactivate the automatic tracking control, and set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).
2) Turn the height adjustment screws of tape guide rollers No. 3 and No. 6 so that the RF output envelope becomes as flat as possible.
3) Press the ▲ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.
4) Press the ▼ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.

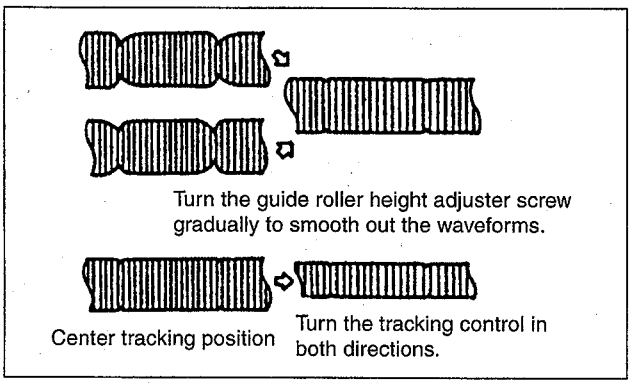

Turn the guide roller height adjuster screw gradually to smooth out the waveforms.
Center tracking position
Turn the tracking control in both directions.

Fig. 2-1

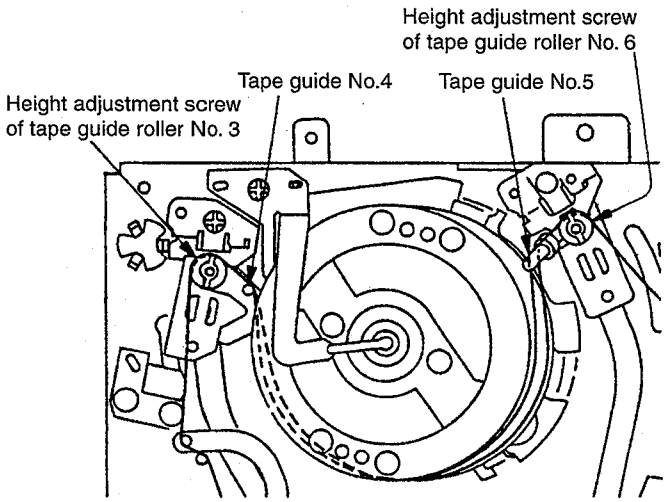

Height adjustment screw
of tape guide roller No. 6
Tape guide No.4
Tape guide No.5
Height adjustment screw
of tape guide roller No. 3

Fig. 2-2

2-2. ACE HEAD ASSEMBLY ADJUSTMENT (ROUGH ADJUSTMENT) (Figs. 2-3 and 2-4)

Purpose: Allows the tape to make even contract with the head for recording and playback of the specified track.

Mode	Playback
Jig	Blank tape
Adjustment locations	Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Mount the ACE head assembly. AT this time, adjust the height so that the height of guide flange No. 7 matches the level of the lower edge of the control head.
2) Remove the adjustment tool and load a new tape, then set the unit for playback.
3) Check that the tape does not curl or rise up noticeably near the ACE head.
4) If the tape curls up or rises noticeably, readjust the tilt adjuster screw and the height adjuster nut.
   (The height of the ACE head should be adjusted so that the lower edge of the tape is approx. 0.1 to 0.15 mm from the control head.)
5) Perform precision adjustment.

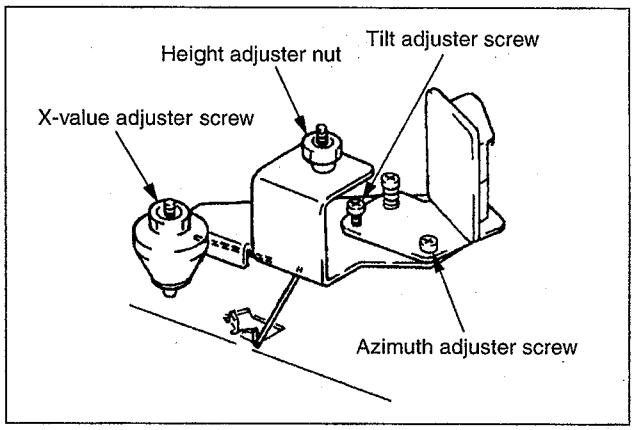


Fig. 2-3

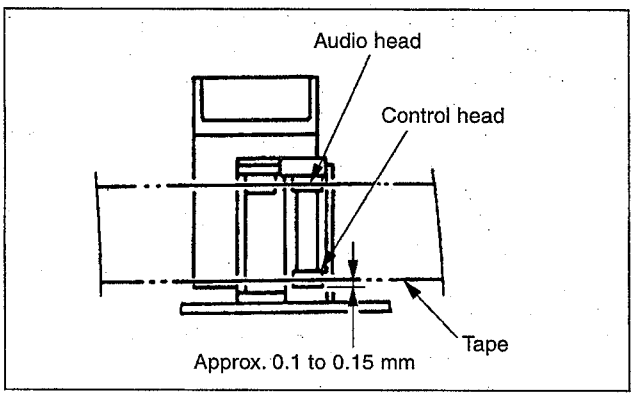


Fig. 2-4

2-3. ACE HEAD ASSEMBLY ADJUSTMENT (PRECISION ADJUSTMENT)

Mode	Playback
Signal	Alignment tape (KRV-52PL 4 kHz) (For PAL)
Measuring instrument	Oscilloscope
Measuring point	Audio output terminal
Adjustment locations	Azimuth adjuster screw, Height adjuster nut, Tilt adjuster screw

[Adjustment Method]

1) Adjust the tilt adjuster screw in the FWD or REV mode so that the lower flange of guide No. 7 does not curl up or rise.
2) Alternately adjust the azimuth adjuster screw, the height adjuster nut, and the tilt adjuster screw to maintain even audio output at maximum with minimum deviation.

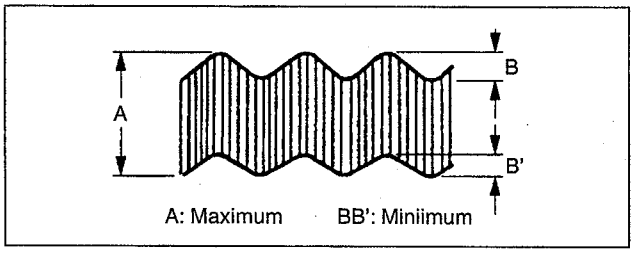


Fig. 2-5

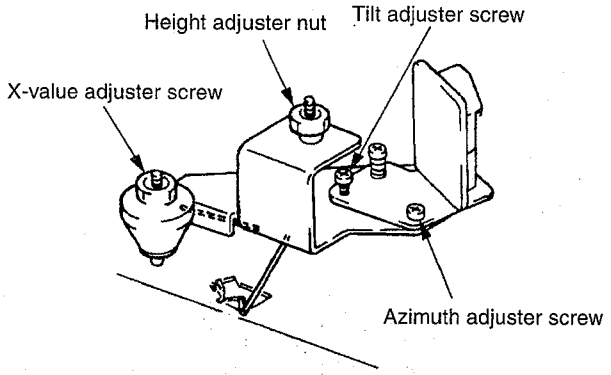
Note: In the adjustment of ACE head assembly (coarse adjustment and fine adjustment), if a azimuth, height and tilt were adjusted, again adjust the height of No. 3 and No. 6 guide rollers.

2-4. X-VALUE ADJUSTMENT

Purpose: To obtain compatibility with other VCRs.

Precaution: Before starting to adjust X-value, set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape KRV-52PL
Measuring instrument	Oscilloscope TIM/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH-1: Connector PB RF pin for RF PC board check CH-2: Connector RF SWP pin for RF PC board check
Adjustment locations	X-value adjuster screw



RF output shall be maximum at the center position of the tracking control.

Fig. 2-6

[Adjustment Method]

Set the tracking control at the center position. For the VCRs equipped with narrow gap video heads, set the X-value adjustment screw where a maximum RF output is obtained. For the VCRs equipped with wide gap video heads, set the X-value adjustment screw both where a maximum RF output is obtained and where the RF output decreases immediately when the ▼ tracking control key is pressed.

1. Adjusting X-value

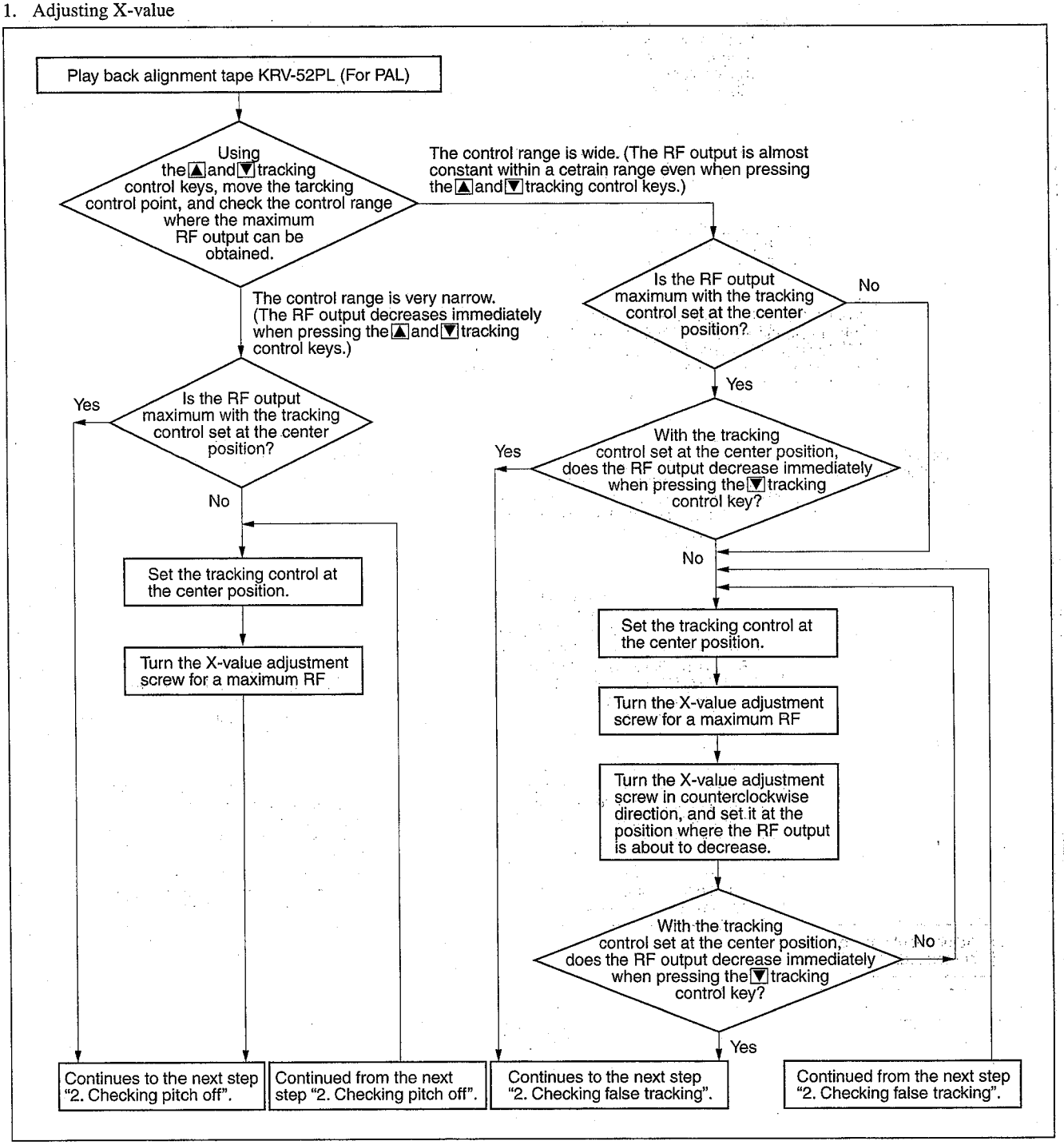

Play back alignment tape KRV-52PL (For PAL)
Using the ▲ and ▼ tracking control keys, move the tarcking control point, and check the control range where the maximum RF output can be obtained.
The control range is wide. (The RF output is almost constant within a cetrain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Is the RF output maximum with the tracking control set at the center position?
No
Yes
Is the RF output maximum with the tracking control set at the center position?
Yes
No
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
No
Set the tracking control at the center position.
Turn the X-value adjustment screw for a maximum RF
Set the tracking control at the center position.
Turn the X-value adjustment screw for a maximum RF
Turn the X-value adjustment screw in counterclockwise direction, and set it at the position where the RF output is about to decrease.
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
No
Yes
Continues to the next step "2. Checking pitch off".
Continued from the next step "2. Checking pitch off".
Continues to the next step "2. Checking false tracking".
Continued from the next step "2. Checking false tracking".

Fig. 2-7

2. Checking false tracking

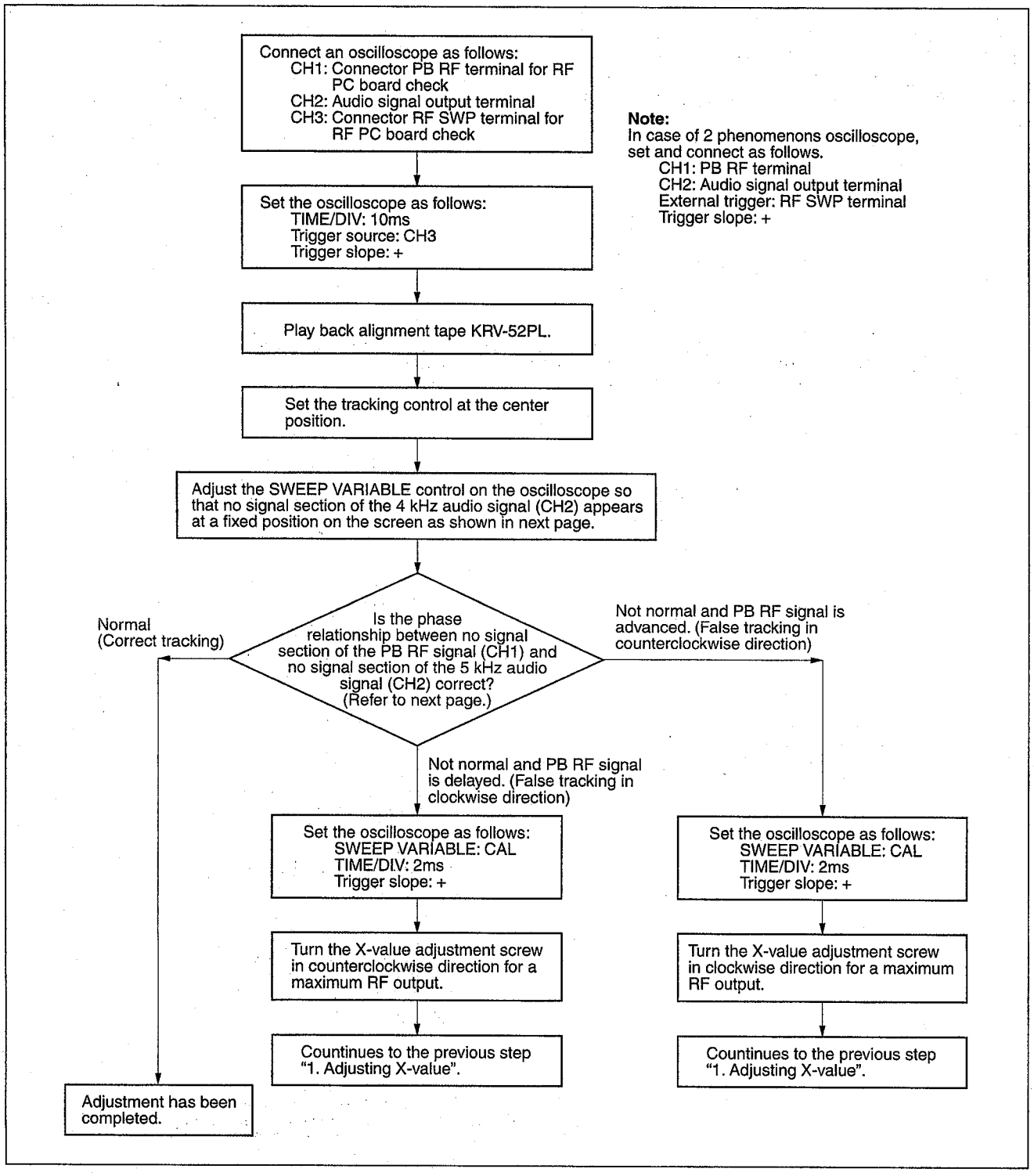

Connect an oscilloscope as follows:
CH1: Connector PB RF terminal for RF PC board check
CH2: Audio signal output terminal
CH3: Connector RF SWP terminal for RF PC board check
Note:
In case of 2 phenomenons oscilloscope, set and connect as follows.
CH1: PB RF terminal
CH2: Audio signal output terminal
External trigger: RF SWP terminal
Trigger slope: +
Set the oscilloscope as follows:
TIME/DIV: 10ms
Trigger source: CH3
Trigger slope: +
Play back alignment tape KRV-52PL.
Set the tracking control at the center position.
Adjust the SWEEP VARIABLE control on the oscilloscope so that no signal section of the 4 kHz audio signal (CH2) appears at a fixed position on the screen as shown in next page.
Is the phase relationship between no signal section of the PB RF signal (CH1) and no signal section of the 5 kHz audio signal (CH2) correct? (Refer to next page.)
Normal (Correct tracking)
Not normal and PB RF signal is advanced. (False tracking in counterclockwise direction)
Not normal and PB RF signal is delayed. (False tracking in clockwise direction)
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Turn the X-value adjustment screw in counterclockwise direction for a maximum RF output.
Countinues to the previous step "1. Adjusting X-value".
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Turn the X-value adjustment screw in clockwise direction for a maximum RF output.
Countinues to the previous step "1. Adjusting X-value".
Adjustment has been completed.

Fig. 2-8

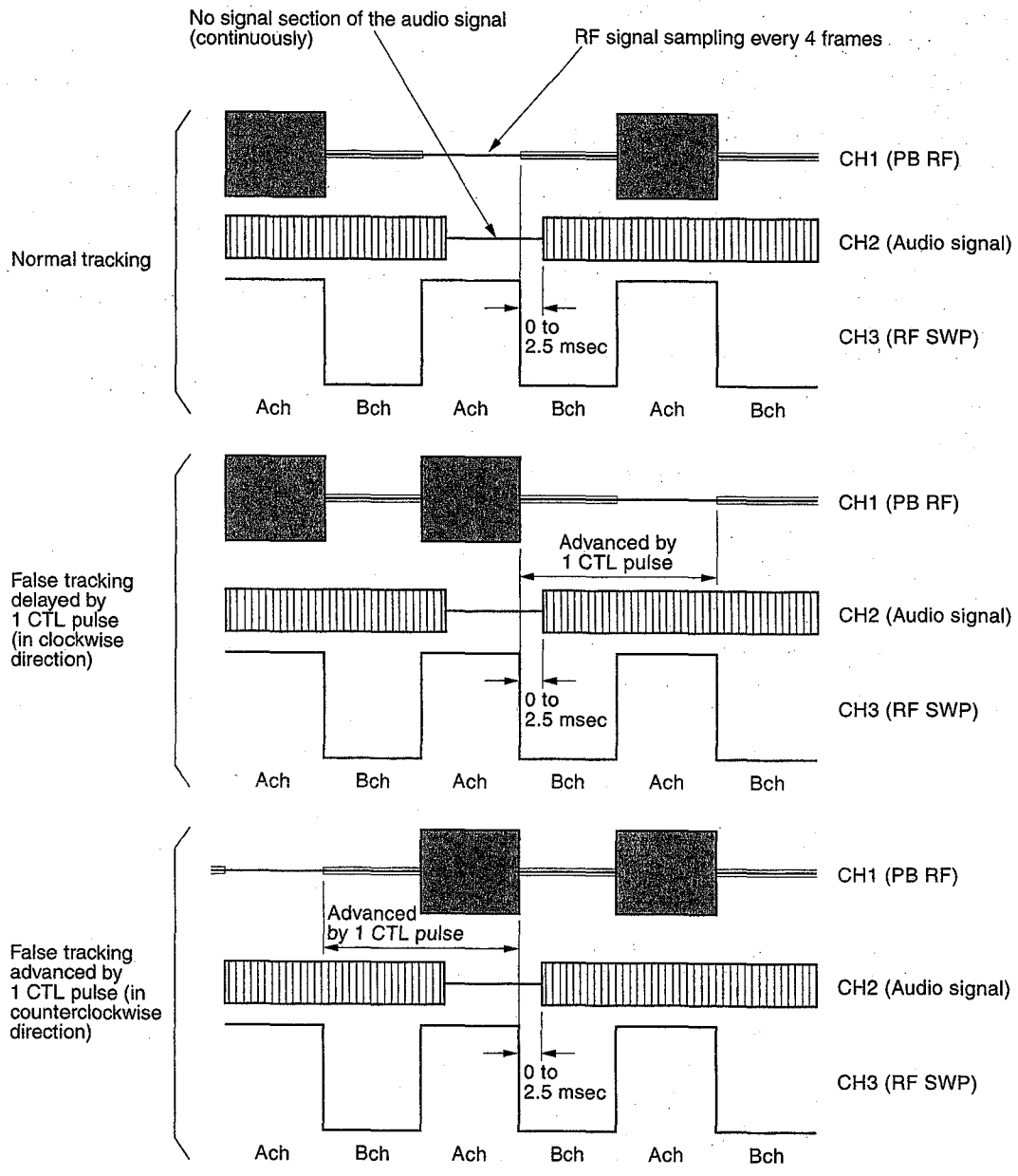

No signal section of the audio signal (continuously)
RF signal sampling every 4 frames
Normal tracking
CH1 (PB RF)
CH2 (Audio signal)
CH3 (RF SWP)
0 to 2.5 msec
Ach
Bch
Ach
Bch
Ach
Bch
False tracking delayed by 1 CTL pulse (in clockwise direction)
Advanced by 1 CTL pulse
False tracking advanced by 1 CTL pulse (in counterclockwise direction)

Fig. 2-9

2-5. ADJUSTMENT AFTER REPLACING THE DRUM (VIDEO HEAD)

Purpose: Co-relative height, X-value and other factors of the drum will deviate from those of the guide roller. If the drum is replaced properly, these deviations are extremely small.

Note 1: Deactivate the automatic tracking control for setting the mechanism in manual tracking control mode.

Note 2: To set the tracking control at the center position, deactivate the automatic tracking control by pressing the tracking [AUTO/MANUAL] key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape KRV-52PL (For PAL), blank tape
Measuring instrument	Oscilloscope
Measuring point	CH-1: Connector PB RF pin for RF PC board check. CH-2: Connector RF SWP pin for RF PC board check.
Adjustment locations	Guide roller (Refer to 2-1.) Switching position (Refer to the Service Manual) X-value (Refer to 2-3.)

[Adjustment Method]

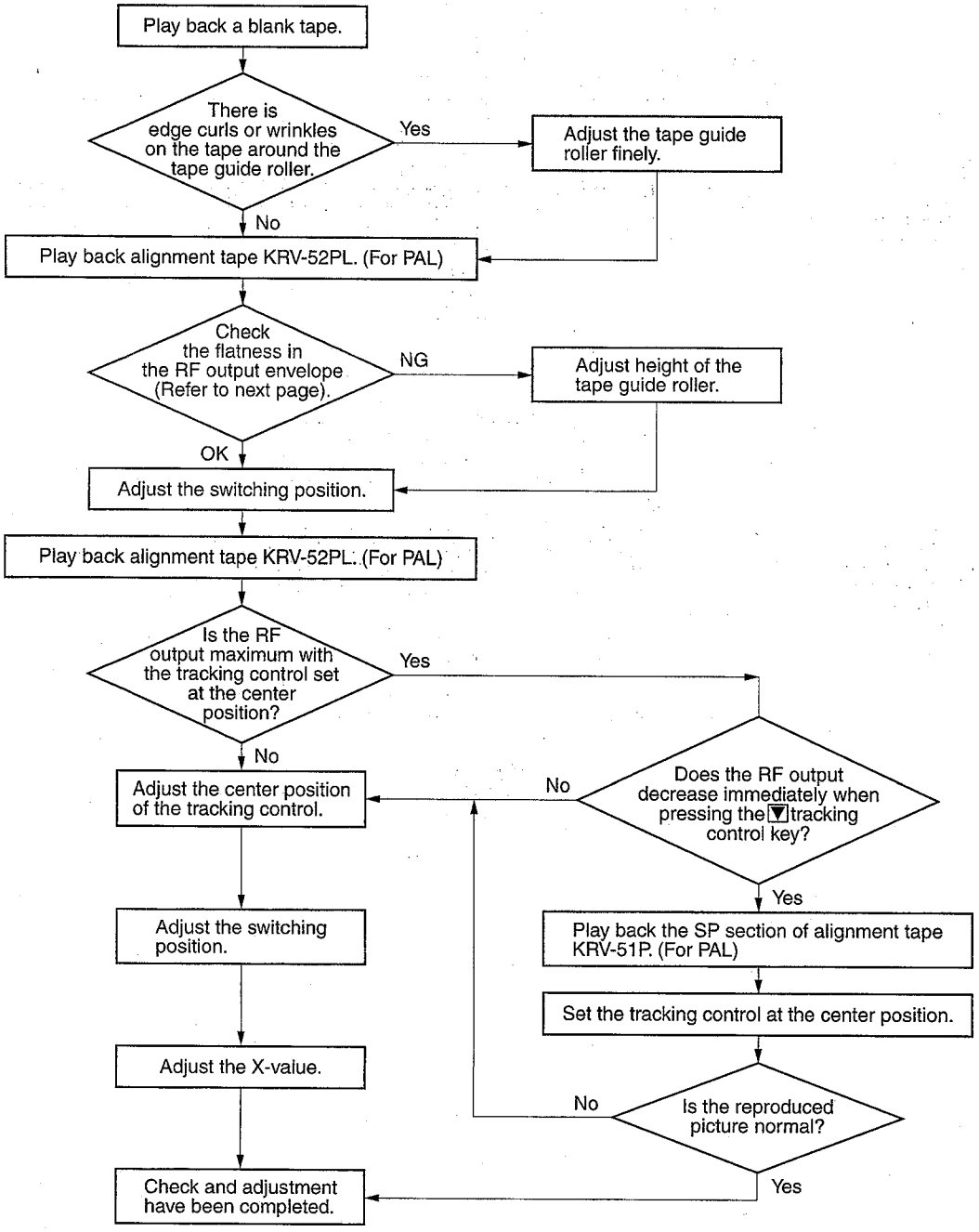
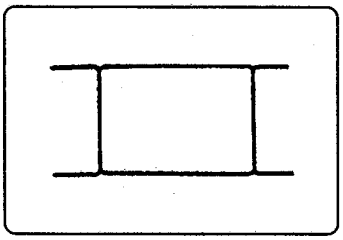

Play back a blank tape.
There is edge curls or wrinkles on the tape around the tape guide roller.
Yes
Adjust the tape guide roller finely.
No
Play back alignment tape KRV-52PL. (For PAL)
Check the flatness in the RF output envelope (Refer to next page).
NG
Adjust height of the tape guide roller.
OK
Adjust the switching position.
Play back alignment tape KRV-52PL. (For PAL)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
Adjust the center position of the tracking control.
No
Does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
Adjust the switching position.
Play back the SP section of alignment tape KRV-51P. (For PAL)
Set the tracking control at the center position.
Adjust the X-value.
No
Is the reproduced picture normal?
Yes
Check and adjustment have been completed.

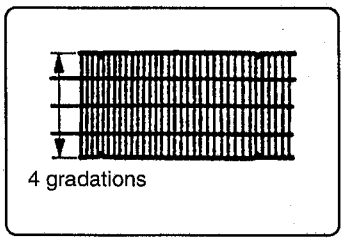
Fig. 2-10

[Checking the evenness and fluctuation of the RF output]

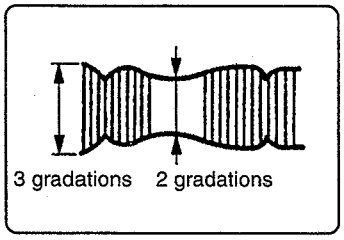
1) Set the RF output to the maximum level using the tracking buttons.



2) Perform fine adjustment of the voltage level range of the oscilloscope, then adjust the RF output deviation to within 4 gradations.



3) Press the tracking buttons and adjust the maximum amplitude of the RF output to within 3 gradations.
4) AT this time, check if the minimum amplitude is more than 2 gradations.



5) Check that the RF output fluctuation between minimum and maximum levels is within 13%.

Fig. 2-11